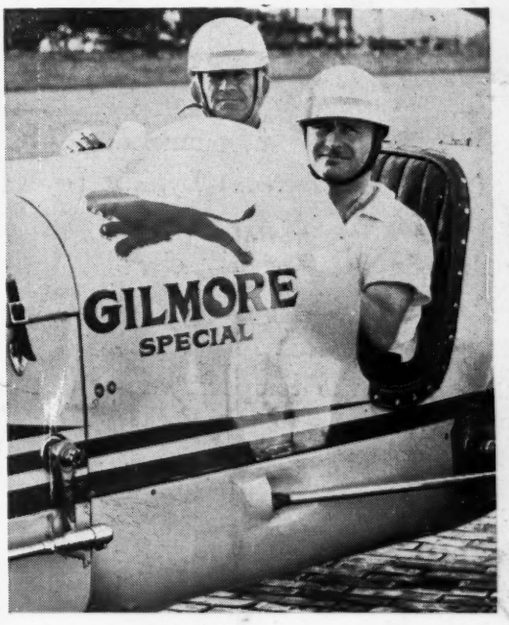
# MOTOR AGE

CHILTON PUBLICATION
EVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

OCTOBER
1937

## IN THIS ISSUE




Wilbur Shaw, National Racing Champ

### Hard Starters

This timely article tells all you need to know on how to start the tough ones during cold weather. Read it now and be ready for winter business.

### New Cars

Here are the complete descriptions of the first of the 1938 models—Packard, Studebaker, Hupp and Willys. The rest will be released in the November issue.

### Plymouth Transmission

A detailed service story giving short cuts on overhauling this popular unit.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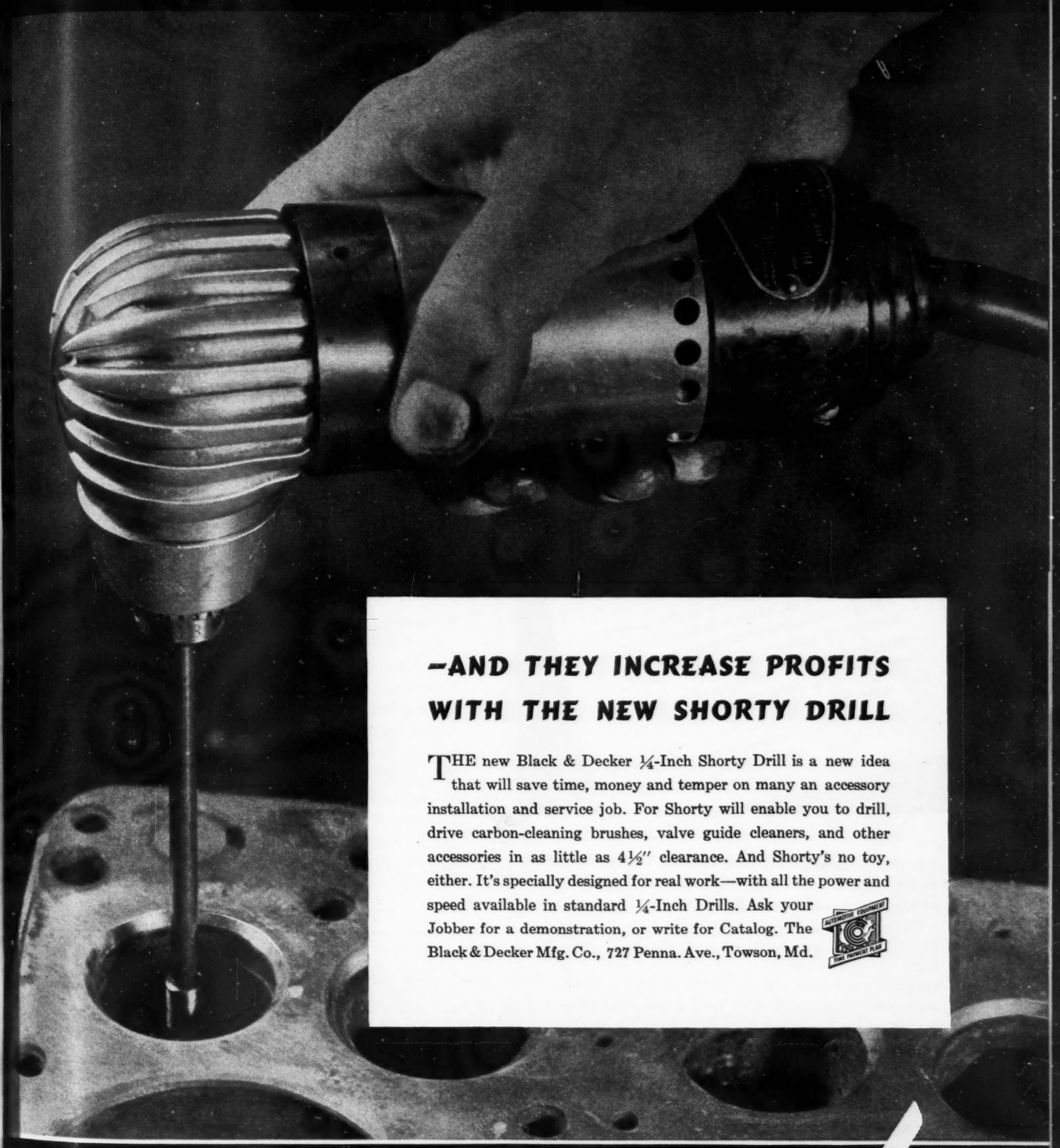

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# MOTOR AGE

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## In This Issue






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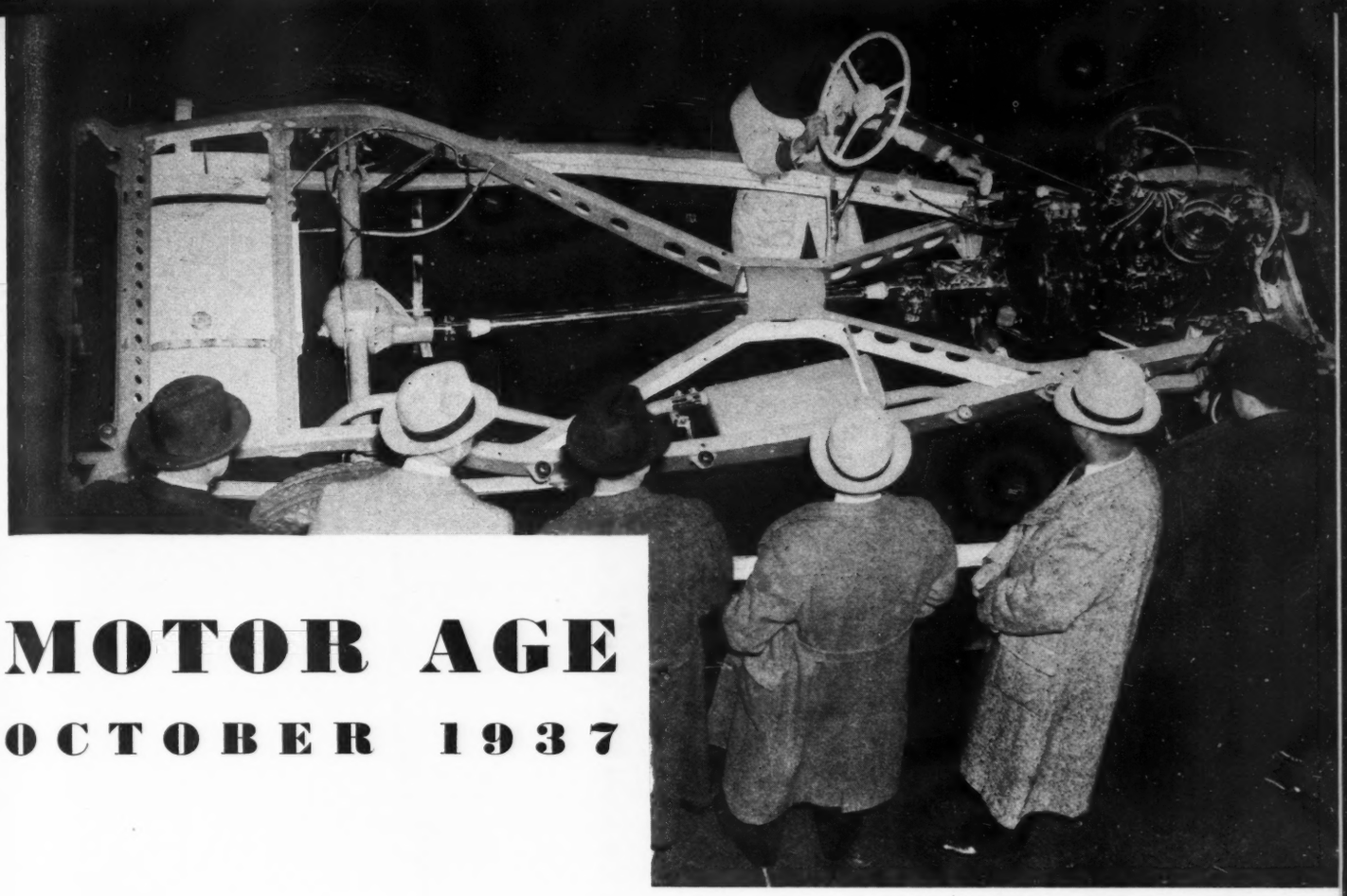


# MOTOR AGE

## OCTOBER 1937

# SHOP TALK

### The New Cars

This issue gives the dope on all of the new cars that have been released to date. The rest of them will follow in the November issue. The high points seem to be improved riding qualities, as the result of better springing, and the wider use of automatic transmissions. Of course, appearance has been changed, but nothing radical. As usual, the rear-engined job, about which we have been hearing so much during the last few years, has been postponed for another year at least.

The Packard, Studebaker, Hupp and Willys stories are in this issue. Several others just missed getting in because of release dates. Service procedure seems to be the same as on previous models, but detailed service stories will be printed as soon as the cars get on the road.

### What Price Wages

As the result of labor activities in at least twenty of the larger cities throughout the United States, independent and dealer shops have agreements of some sort with the unions. Charges to the customer are now booked at $2.50 to $3.00 per hour, with mechanics being paid up to $50 per week in some cities.

### Guessing Contest

H. H. Roe, of Paramount Auto Service, Duluth, Minn., has been having a tough time hopping up a 1932 Study President. He had done everything called for, and all I could think of was that perhaps the clutch was slipping or his speedometer was cockeyed. But he says the inhabitants of that town have one leg longer than the other from walking along the sides of the hills, so a slipping clutch soon shows up. I'll have to guess again.

### Drinks on the House

Carl Ferguson, of Wilmington, Del., who has a Packard that seems to work better with burned points, reminds me that the points on a Mallory distributor can not be synchronized. I'll have to buy the drinks on that, as I had suggested to him to try synchronizing the points a little better. Anyone interested in this problem will find all the details in the Clearing House in the September issue. I've got a set of worn-out piston rings that I'll give to anyone throwing some light on the subject.

### Gusto and Chin Music

That's the way Eric Smith, who neglected to give his address, says he welcomed the receipt of a Chilton Tune-Up Manual, and then inquires if he can get the same dope on trucks. It's in the Flat Rate manual, Eric, in somewhat different form but it's all there and it's all true.

### Pfeiffer Sets the Pace

"I was very much interested in your article in August MOTOR AGE in reference to compression. In fact, I read the second paragraph about five times in order to let it sink in," writes Bill Pfeiffer, of Tacony, Pa. That's swell Bill, I hope the rest of the readers follow your example.

Bill Toboldt

# Hard Starters

## Need expert treatment — particularly in cold weather

*By* ***BILL TOBOLDT***

BUILDING a fire under a balky mule or cracking a whip over a team of horses is all that is needed to get such animals moving. But, when cold weather rolls around, it takes a good mechanic who knows his stuff to get an engine started.

There is plenty of money in such business even though it means a lot of overtime for the boss, or the hiring of additional mechanics, for it seems that automobiles know nothing about a 40-hour week and refuse to limit their contrariness to between the hours of 8:30 and 5:30.

Modern engines seem to give more trouble in this respect than some of the old timers and it often happens that the smaller the mileage on a car—the harder it is to start. The reason for this is that the higher compression engines place a heavier load on the battery, thus leaving less power for the ignition sytem. The smaller clearances on new engines have a similar effect.

In this connection it should be pointed out that even though a battery is able to crank an engine, the pistons will not be moving fast enough to draw the gas through the carburetor at sufficient speed to secure good vaporization and distribution of the fuel. This is particularly true of modern engines fitted with large size carburetors.

Poorly adjusted or defective automatic chokes are also a frequent cause for hard starting. Sometimes such units result in over-choking, on other occasions it is up to the mechanic to locate the trouble and make the necessary repairs or replacements.

However, the most frequent causes of hard starting are electrical and/or lack of compression.

A good battery fully charged is the first essential for quick starting when the bottom has dropped out of the thermometer. But, a good battery won't be of much help if the electrical connections are corroded and dirty, or if cables are too small in size which would, of course, place additional resistance in the line. All electrical connections must be checked to be sure they are clean and tight.

Ignition timing and the condition of the breaker points are also important factors of the hard starting trouble. A mechanic will do his customer a favor and increase his profits if he will install new breaker points instead of dragging a file across the old points. When a set a set of breaker points have seen ten, or at the most fifteen, thousand miles of service, they are ready for the scrap heap. It is true that points can be made to serve much longer but it is impossible to obtain the correct cam angle with them. The result is that the current will not flow through the ignition coil for a sufficient period to produce a good spark. By all means install new points.

Further in connection with the ignition system, new spark plugs will make starting easy. In addition, coils and condensers should be tested on a good test bench and replaced with new units, if found not up to standard. High tension cables also contribute their part to the hard starting problem and should be replaced when necessary.

The new winter oils, such as 10W and 20W, have assisted materially in reducing hard starting complaints. Their use lowers the draw on the battery and leaves a larger portion of the battery's power for producing a good hot spark.

In addition to the electrical and carburetion causes of hard starting previously mentioned, there is compression to be considered. This is most important and is frequently overlooked. Compression tests with a good pressure gage should always be made when preparing engines for winter service. It will pay big dividends in locating carbon, valve and ring jobs.

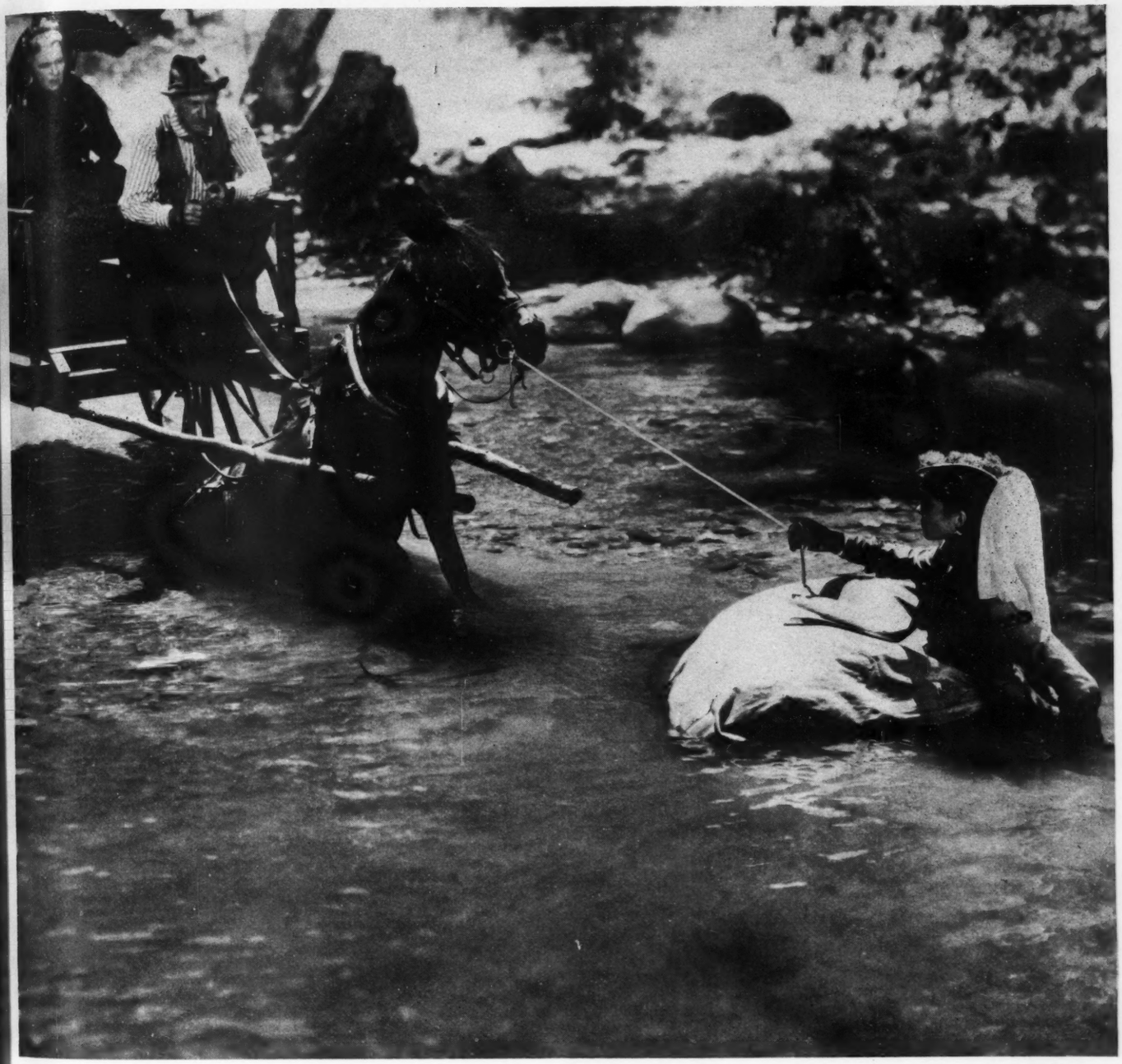


Photo from the "Woman Rebels," courtesy RKO Radio Pictures.

## Winter Service Suggestions

Flush cooling system. Check for leaks.

Check hose connections. Install new ones if necessary.

Check cooling system thermostat.

Check water pump and water pump packing. Tighten packing gland or install new packing as required.

Fill cooling system with anti-freeze.

Install car heater.

Drain and flush engine crankcase, transmission and rear axle and refill with winter grade lubricant.

Check engine compression. Grind valves, install new pistons and rings where necessary.

Adjust valve tappets.

Check battery. When necessary recharge or install new battery. For chronic hard starters install oversize battery.

Clean battery terminals, ground connection and all ignition wiring. Install new cables where necessary.

Clean and tighten all electrical connections in ignition and lighting circuits.

Check generator armature and brushes. Turn down armature and install new brushes where necessary.

Check starter brushes and armature. Also starter drive. Repair or install new parts as required.

Check ignition distributor, including cap, breaker points and distributor shaft bushing. Repair or install new parts as required.

Adjust breaker points and retime ignition.

Check ignition condenser. Replace if necessary.

Check ignition coil. Install new unit when required.

Check engine ground connections.

Clean and adjust spark plugs. Install new ones when necessary. On chronic hard starters, reduce gap.

Check ignition high tension cable. Replace if necessary.

Clean all fuel screens, and clean oil filter.

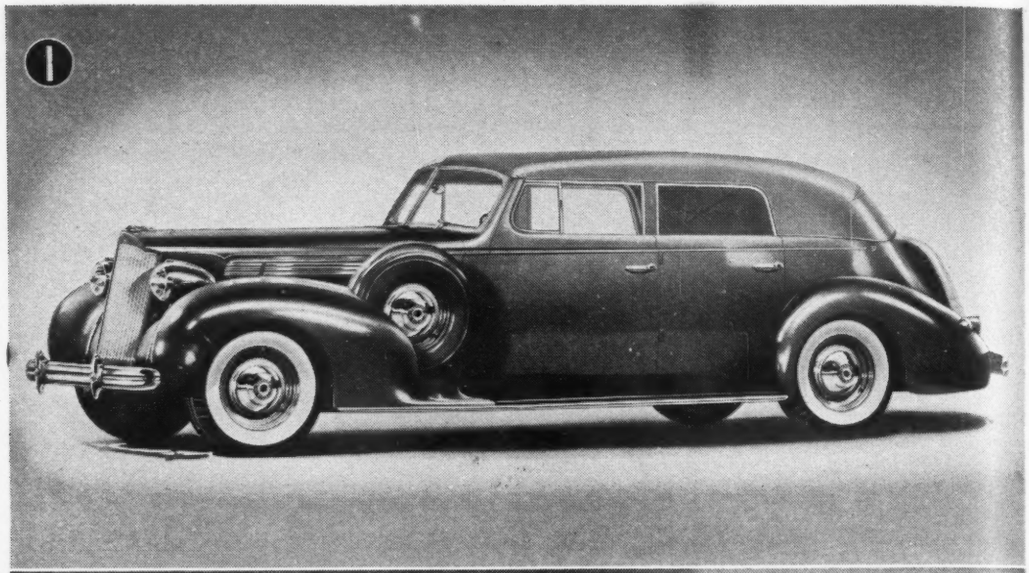
Clean and adjust carburetor.

Check and adjust automatic choke.

Free-up and adjust brakes. Reline if necessary.

Touch up rust spots and paint top.

Regroove tires or install new ones.





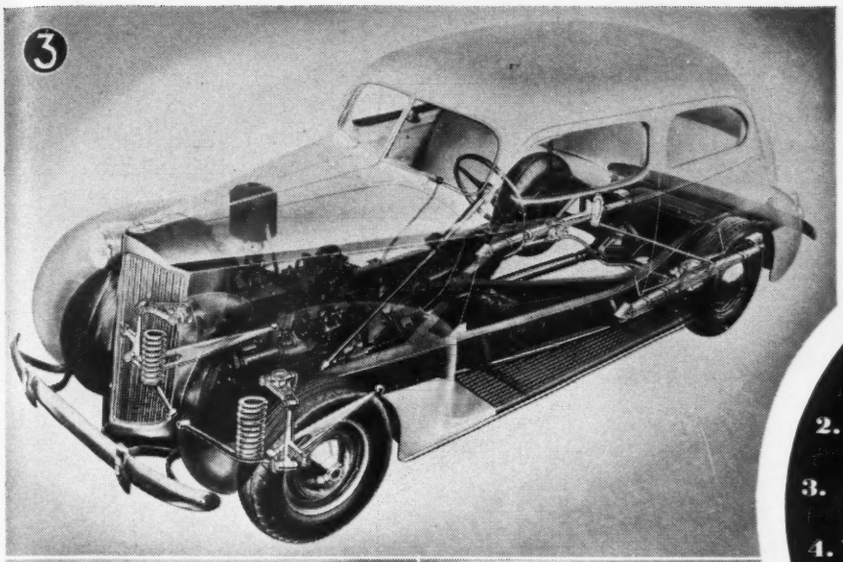
# PACKARD

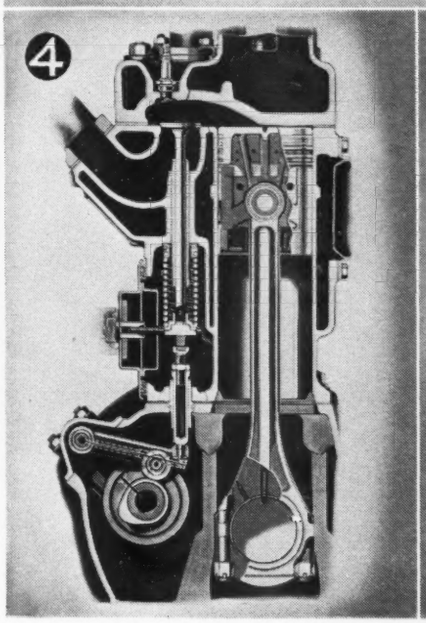
## Four cars, with a six and wheelbase is increased 7

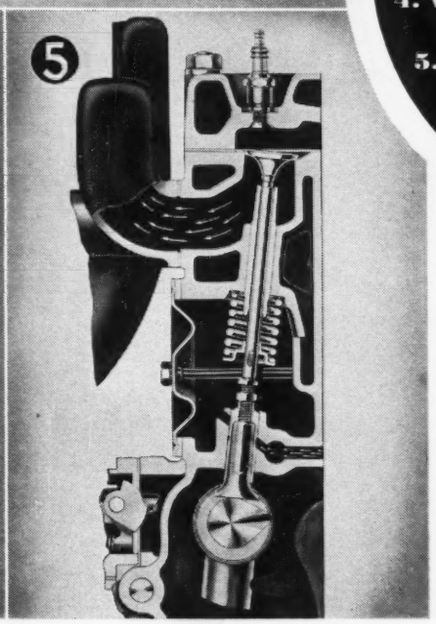
FOUR lines of cars will be offered by Packard for 1938—the Six, Eight (formerly the 120), Super Eight, and Twelve—with 35 different body models.

The Junior line, consisting of the Six and Eight, incorporates many outstanding changes that set it apart from any previous lines. First are the new all-steel bodies with seamless steel tops, using 11 different types of thermal and acoustic insulating materials. Next is the increase in wheelbase of seven inches on both models, making the Six 122 in. and the Eight 127 in.

The next important mechanical improvement is the complete isolation of the wheels from the body and frame by the generous use of rubber at various points. Perhaps the most outstanding development on the Junior line is a unique spring suspension using a controlled friction leaf spring at the rear in combination with a special hook-up of shock absorbers, sway bar and rear stabilizer. This is said to give







1. The new convertible sedan on the Eight cylinder chassis
2. The Packard Six, two-door, touring sedan
3. Suspension details of the Junior line. Note the rear springs
4. Water jackets of the Super-Eight engine have been lengthened
5. Valves on "Six" and "Eight" engines are now on an angle. Tappets are pressure lubricated

## eight known as the Junior line, on which inches, feature the 1938 announcement

an unusually good ride with no wander and no reaction at the front.

While many changes have been made in the principal chassis units, they remain substantially the same as before save for the details to be mentioned later.

The Senior line models have been improved in many particulars, to be noted later, but remain substantially the same mechanically and in body construction.

In general, all lines have thermostatically controlled radiator shutters as standard equipment. All four engines now are fitted with the Bohnalite Autothermic pistons, first used last year on the Six. Slanting windshields are used throughout with wind shield defrosters consisting of long louvers in the garnish molding. Hypoid rear axles and independent front springing, the Safe-T-Flex system, are continued on all lines.

Of interest to car owners and service men is the redesigned lubricating system which requires attention only at 5000-mile intervals.

Engines on the Junior line remain basically the same with many refinements. The Six is an L-head, with 1/16 in. larger bore, now 3½ in. x 4½ in. stroke, 245 cu. in. displacement. Horsepower remains the same, 100 hp. at 3600 r.p.m., but the torque is improved at low speeds. Compression ratio is 6.52 to 1 with cast iron head; optional ratio, 7.05 to 1, using aluminum head.

The Eight remains an L-head, with 3¼ in. bore and 4½ in. stroke, 282 cu. in. displacement, rated 120 hp. at 3800 r.p.m. Compression ratio is increased to 6.6 to 1 with aluminum alloy head; optional ratio, 7.05 to 1.

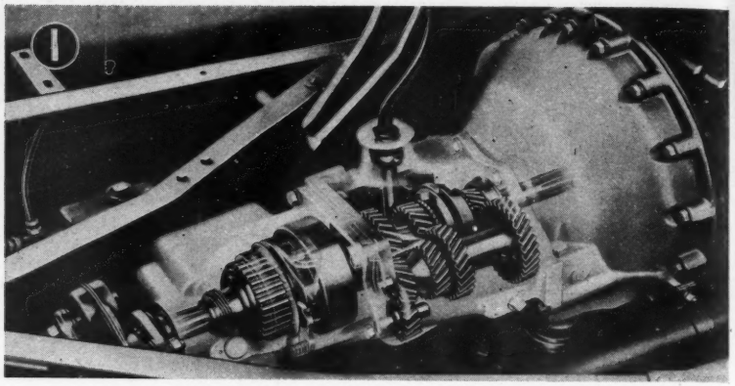
The following features are now common to both engines—improved rubber motor mounts, new camshaft, new pressure lubricated mushroom tappets, longer water jackets. Autothermic tin-plated pistons, larger capacity ball-bearing water pump, 18 in. low speed fan, thicker main bearing caps, larger capacity generator.

Both engines are equipped with an oil filter of novel construction, of two-stage type. Ordinarily the oil fed to the tappets goes through the filter in the conventional manner but as a further safeguard, when the filter becomes blocked a suitable by-pass and auxiliary screen assures oil supply to pressure lubricated tappets. This will protect the engine even if the owner fails to replace the filter element at the right time.

Clutches remain the same in detail, 9½ in. on the Six and 10 in. on the Eight. However, they incorporate a new release mechanism which reduces tendency to harshness or chatter. Transmissions remain the same except that the second speed gears have been increased to one inch in width.

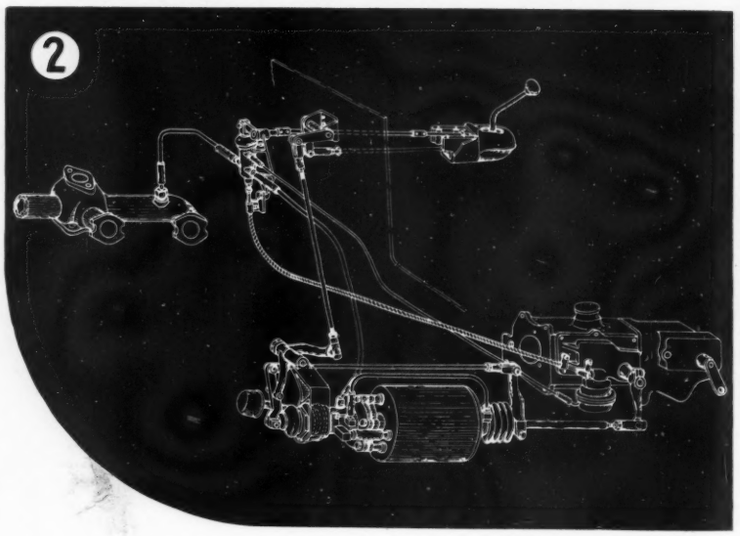
While the front springing is continued unchanged, the program of

*(Continued on page 58)*




# STUDEBAKER

## Remote Control Gear Shift—Stronger, Lighter Frames—New Body Lines




COMPLETELY restyled from stem to stern, and expressed in new sheet metal tailoring, three lines are offered by Studebaker for the '38 season. The President, mounted on a 122 in. chassis—the Commander, and the Studebaker Six, both mounted on the same 116½ in. wheelbase chassis.

Body models comprise the following types for the entire line: coupe (3-pass.), club sedan (2-door), cruising sedan (4-door), convertible sedan (4-door).

Although mechanical units, in the main, are the same as last year, in detail they embody many important refinements and introduce some major changes well worth noting in standard equipment and optional features.

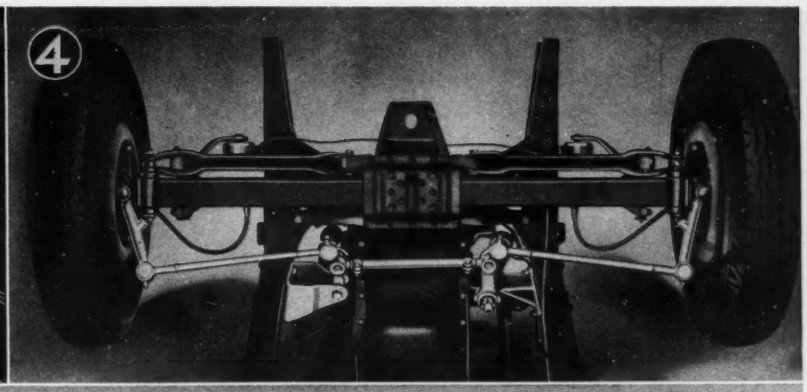
The objective for this year has been to lighten up the President so as to use substantially the same units for the three models but without any sacrifice in performance. To this end, the President is about 200 pounds lighter than last year. It is mounted on a new frame about 18 per cent lighter than last year's but with an increase in torsional rigidity of around 70 per cent. The chassis for the Sixes also is new, about eight pounds lighter but with torsional rigidity upped over 300 per cent.

Planar independent suspension at the front—now in its fourth season—has been greatly improved and is carried as standard equipment on the entire line. The Hill-holder, formerly optional, now is standard on the President and Commander, optional on the Six. Overdrive, optional on the President and Commander, is of the type used on last year's Dictator. The automatic overdrive has been discontinued in favor of the unit that comes in automatically at around 45 m.p.h.—cuts out at around 35 m.p.h.—and can be locked out manually.

Abandoning the direct-acting shock absorbers used last year, Studebaker uses Houde two-way hydraulic shocks with thermostatic compensation on the rear. Steering hook-up has been improved. Last year's hypoid axles are continued with standard reduction of 4.55 to 1; optional 4.82 to 1. The same transmission is used but with a new case for mounting on its side with side shift rails to facilitate the application of the remote control which is optional. The rolled-over transmission takes up much less room vertically and has entirely eliminated the front compartment tunnel.

One of the major novelties for the new lines is the adoption of the combination vacuum-mechanical remote control gear shift which is optional equipment. It is mounted on the instrument panel, in the center, and gives the same "feel" of gear changes as the conventional lever.

Long semi-centrifugal clutch is



1. By placing the transmission on its side, the tunnel in the front floor boards has been eliminated
2. Schematic view of the new vacuum transmission control
3. A short shift lever mounted on the instrument panel is all that is required for gear shifting on the new models
4. View of the new steering control
5. The lines of the Studebaker Commander coupe are typical of the complete line

standard on the President. The President engine has been moved forward 3½ in., providing more room in the body. Generally, the engines remain the same but with important modifications, to be noted later. Both engines continue the Fram oil filter which is larger and easier to service. On the President, the water pump has been moved from its side mounting up to the front end where it is driven by the fan belt.

Stromberg carburetor with concentric bowl is used on both engines. The automatic choke is built into the carburetor thermostat. Another novelty on Studebaker is a special windshield wiper mechanism combining vacuum power for the blades with a hydraulic chamber piping which makes it possible to supply the blades with a liquid mixture for washing dirt and ice from the windshield.

Finally, there is a telescoping fishpole radio antenna which will be supplied exclusively for all radio equipment. It is side-mounted on the cowl panel and is said to give fairly good reception in the city with the pole fully telescoped and quite out of sight.

The President engine remains 8-cyl., L-head, 3 1/16 in. bore by 4¼ in. stroke, 250 cu. in. displacement. However, compression ratio has been dropped back to 6.0 to 1 from its previous value of 6.5 to 1, and horsepower rating now is 110 hp. at 3600 r.p.m. instead of 115 hp. at 3600.

The Six is the same as before but the bore has been opened up 1/16 in. Specifications this year are: 6-cyl., L-head, 3 5/16 in. bore by 4⅜ in. stroke, 226 cu. in. displacement (217 cu. in. last year). Although the performance in general has been im-

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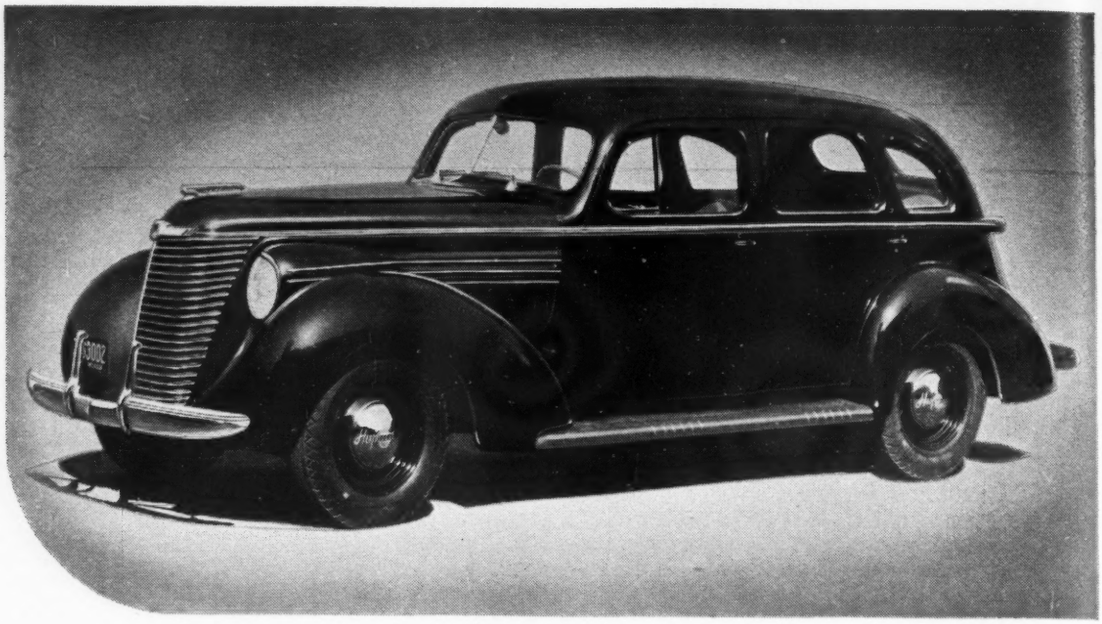
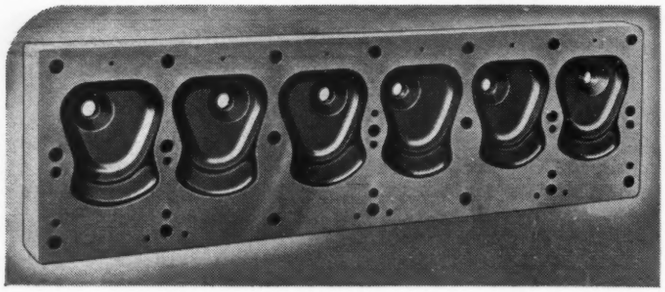


# HUPMOBILE



FOLLOWING the recent reorganization announcements, Hupmobile has groomed three models for 1938 shows—a 122-in. Hupmobile Six, and Custom Six, and a 125-in. Custom Eight. Styling is completely new and in the modern manner but conservatively so. Bodies are of new all-steel construction, and are wider and longer. The top has a separate insulated center panel serving also as an efficient radio antenna.

Mechanically, the '38 Hupmobile line continues the previously used units with modifications in detail which are noted later. An exclusive feature of Hupp engines is the use of the "dummy" anti-distortion heads on the production line when honing cylinder bores and grinding valves so as to simulate the conditions under which the engine is assembled with heads bolted down.

Engines remain the same, with modifications, and are mounted in the frame at four points in rubber. The Eight is 8-cyl., L-head, 3 3/16 in. bore x 4¾ in. stroke, 303.2 cu. in. displacement, rated 120 hp. at 3500 r.p.m., with compression ratio of 5.8 to 1. The Six is 6-cyl., L-head, 3½ in. bore x 4¼ in. stroke, 245.3 cu. in. displacement, rated 101 hp. at 3600 r.p.m. Compression ratio is 5.75 to 1 with 6.2 to 1 as an option. Carter carburetors, dual on the Eight and single on the Six are standard equipment.

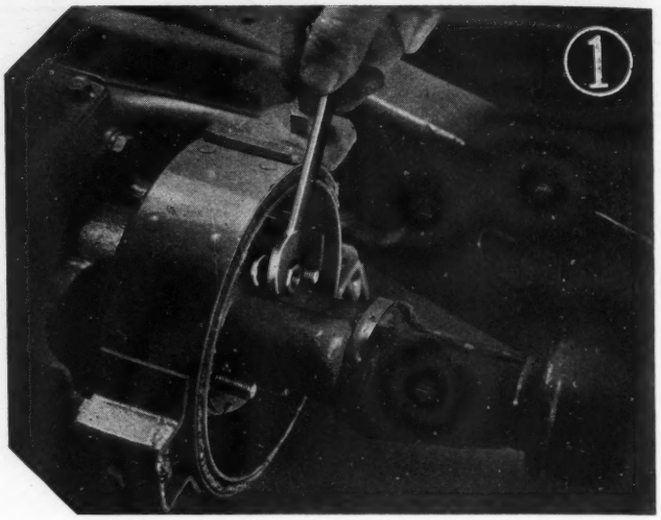
Engine features common to both eights and sixes are: Cast iron heads, chrome-nickel iron alloy blocks with water jackets extending below the ring belt, counterweighted crankshafts balanced statically and dynamically, rubber disk vibration dampers. Main bearings are steel backed, babbitt lined, precision type—four on the Six, five on the Eight. Rifle drilled connecting rods are continued. Connecting rod bearings, also, are steel backed babbitt of interchangeable precision type.

Camshafts are chilled alloy iron castings with low velocity ramp type cams. Camshaft bearings—four on the Six, six on the Eight—are removable leaded bronze, line-reamed in place. Bohnalite aluminum alloy pistons with invar struts are standard. Both engines are fitted with four rings located above the piston pin. The top two are scraper type compression rings while the lower two are oil control rings.

Auto-Lite fan-cooled generator

*(Continued on page 64)*

*"But, officer! Nobody pays any attention if I just put out my hand."*




# Servicing Plymouth Transmissions

**All short cuts are given in this service article on the Plymouth transmission**

TRANSMISSIONS on 1937 Plymouths do not present any particular difficulties to the service men, but the overhaul procedure is of particular interest because of the large number of these cars on the road and also because the procedure applies, in general, to transmissions on many other cars.

The overhaul procedure, as advised by the Plymouth factory, is as follows:

1—Remove floorboards and battery ground cable at transmission.

2—Disconnect universal joints, front and rear, Fig. 1.

3—Remove hand brake rod clevis pin at rear end.

4—Remove nuts from studs which hold transmission to clutch housing, Fig. 2.

5—Disconnect clutch release fork pull-back spring from release fork.

6—Remove clevis pin from clutch release fork rod and pull release fork out of clutch housing, to permit release bearing to clear fork when pulling transmission out.

7—Remove cap-screws holding transmission cover and gear-shifter assembly and lift off cover assembly, Fig. 3.

8—Insert pilot studs in place of the two upper studs in clutch housing to avoid springing clutch disk, and withdraw transmission.

To install, reverse operations.

To disassemble (transmission removed):

1—Remove gear-shifter rail retainer screws and lift out fork and rail assemblies.

CAUTION: Be careful not to lose balls and springs out of front end of transmission case under shifter rails. Remove the balls and springs and lay them aside for assembly.

2—Remove nut on end of transmission mainshaft and pull off universal joint flange.

3—Remove cap-screws holding brake support to transmission case and remove brake assembly.

4—Pull mainshaft assembly back and out of case, using care not to touch the sliding clutch assembly (2-Fig. 4) as the shaft is pulled out.

5—Remove countershaft outer gear lock plate screw and lock plate (at rear of case).

6—Drive countershaft out through rear of case, allowing countershaft gear set to drop in bottom of case. Use special arbor and soft hammer for driving out countershaft.

7—Remove cap-screws holding transmission drive pinion retainer to front of transmission case.

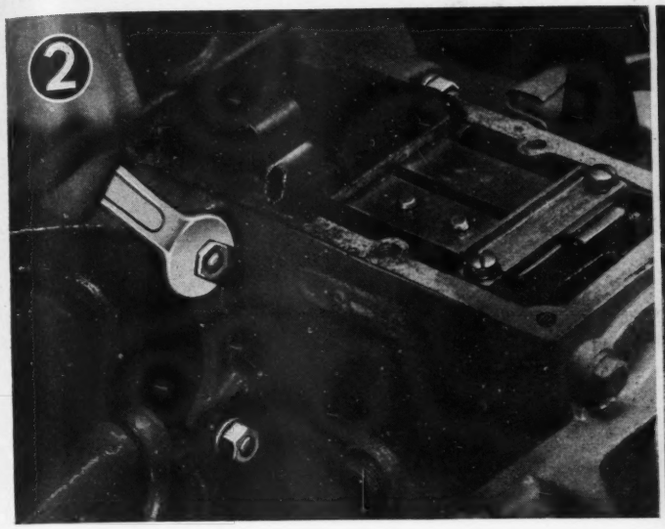
8—Pull out drive pinion and bearing assembly.

9—Lift out countershaft gear set, thrust plate, thrust washer and rollers.

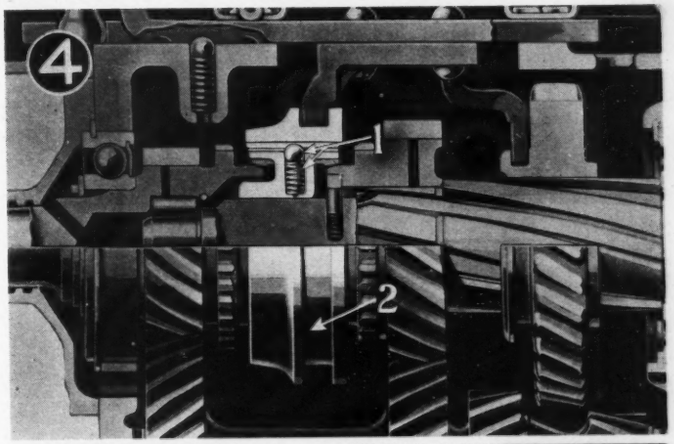
10—Push out idler gear shaft and remove idler gear.

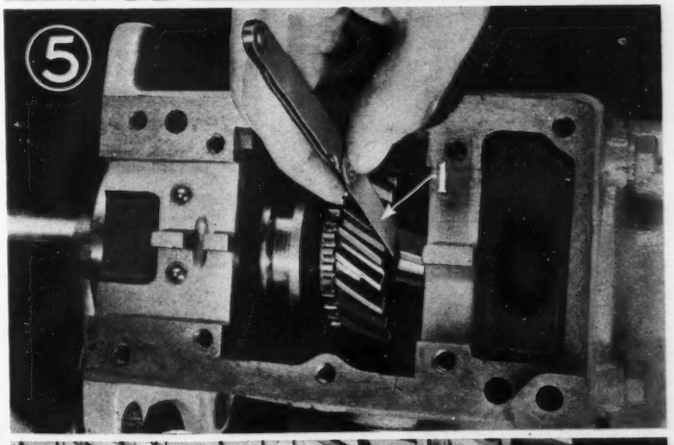
11—Pull the hub out of the sliding clutch sleeve, using care not to lose the balls and springs which hold the two units in neutral position.

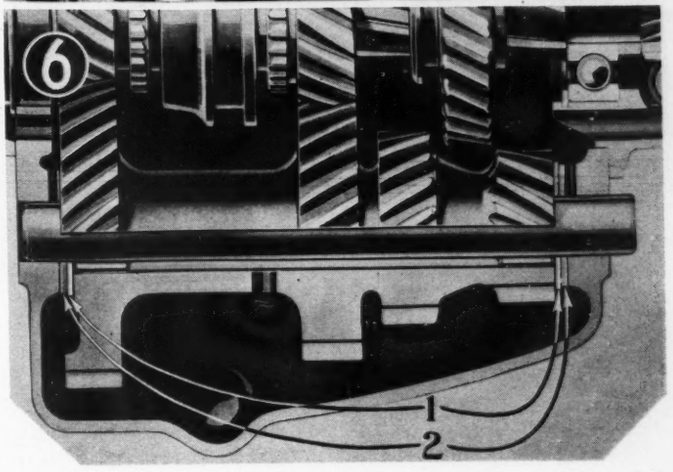
12—Remove the second speed gear thrust washer by pushing a








***BY***
***BILL TOBOLDT***

wire through the hole in the outer edge of the washer and pressing (with the wire) down on the plunger, which holds the thrust washer from rotating, until the washer can be rotated so its internal slots line up with the flange on the mainshaft. Then slide the thrust washer and second speed gear off the shaft.

The bearings on the rear ends of the main drive pinion and the mainshaft are held in place by means of snap rings. Whenever these snap rings are removed, they should be replaced by new rings. Snap rings should not be used a second time.

Free play of a snap ring in its groove results in the increase of thrust forces, which, if sufficiently great, might cause damage to the transmission as well as to the snap ring. Therefore, it is important that snap rings should be carefully fitted into their grooves.

To insure proper fit, snap rings of various thicknesses are available from the Factory Service Parts Department for service replacements. All oversizes are shown in the Parts List book.

When assembling the transmission, all operations are performed in the reverse order of that given for disassembling, but care must be exercised to make certain that:

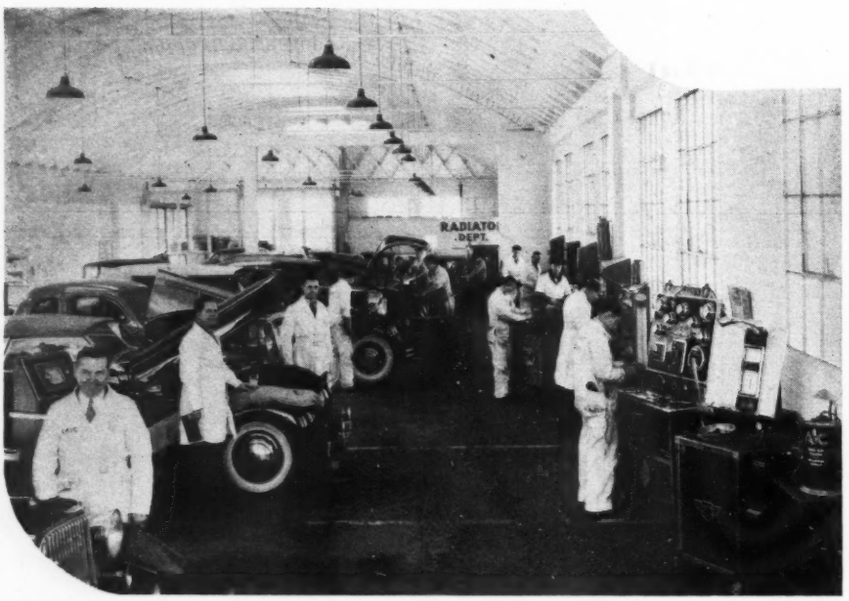
1—Countershaft end-play is from 0.002 in. to 0.008 in.

2—Second speed gear end-play is from 0.003 in. to 0.008 in. Thrust washers of various thicknesses are available to make this adjustment (Fig. 5).

3—Pilot studs are used when assembling transmission to clutch housing, to avoid springing the clutch disk.

*(Continued on page 68)*

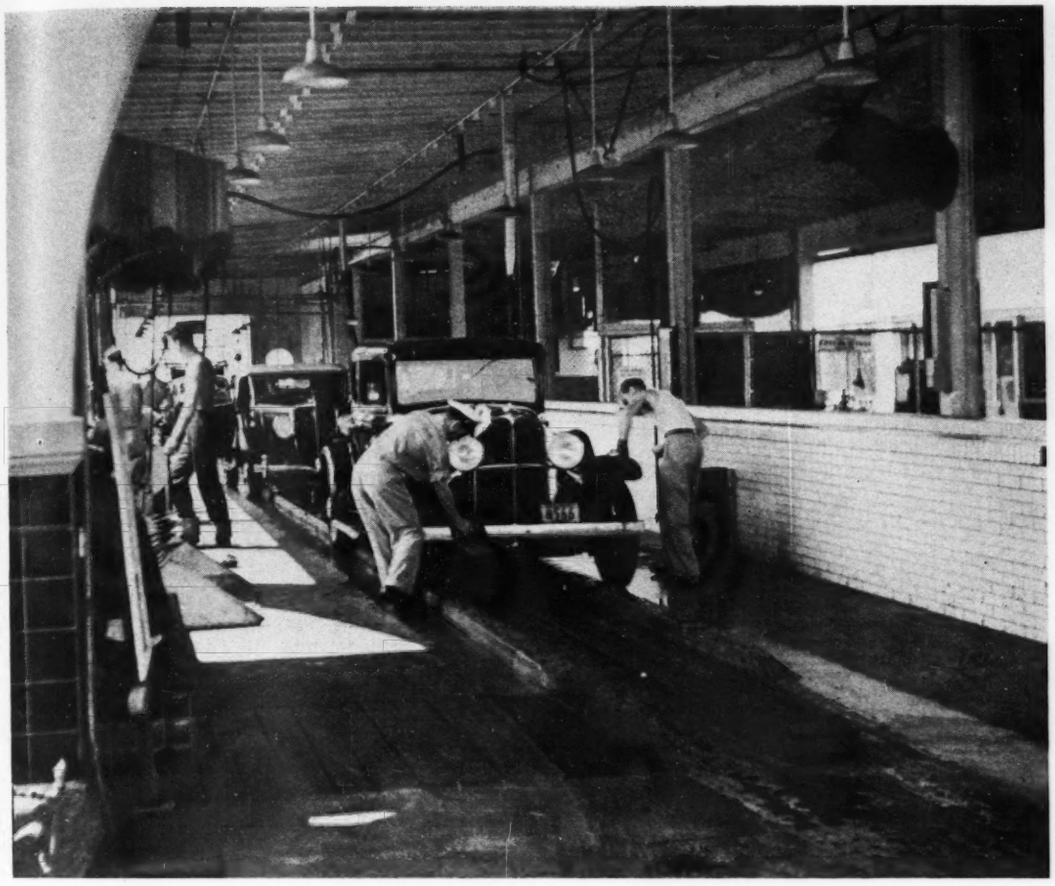

Above is a view of Muller Bros. service station, showing the general layout. Below is the modern, well lighted shop.



# Super-

ONE of the greatest super service stations in the world is Muller Bros., located at 6380 Sunset Blvd., Hollywood, California. Established by Frank and Walt Muller 15 years ago, it has grown from a two-pump station until now it occupies an entire city block. It has 18 departments, all rendering 24-hour service, and 135 employes. The station pumps 75,000 gallons of gasoline a month from 12 pumps, and averages one tire to every 200 gallons of gasoline pumped, and one lubrication job to every 30 gallons which shows real management and salesmanship.

Muller Bros. was one of the first super service stations in Hollywood. John Stayen, their head lubrication man, who has been with them 14 years, pioneered the super service station. The spotless lubrication department has six hoists, and better than 80 cars a day can be lubricated here. The charge is $3.00 a car.



**The auto laundry where 20 cars can be handled at one time, 15 minutes is allowed for each car.**

# -Super Service

## You need a new vocabulary when you start describing the Muller Bros. shop which sells 75,000 gallons of gas per month.

The lubrication men pull a front wheel on every car they lubricate, which enables them to show the owner where a wheel pack is needed and if new grease retainers should be installed to keep the grease from leaking out and perhaps ruining the brake linings.

Frank Muller says, "This is an age of speed. All motorists are in a hurry, yet they are service conscious. The result is that they patronize the station that gives them good service quickly. This is our policy and is maintained in every one of our departments. Our specially equipped repair shop enables us to do many a half-day repair job in half-hour . . . and do it better. This building, as are all our buildings, is well lighted for night work. It is white inside and out, and is kept spotlessly clean."

The $50,000 auto laundry, one of Hollywood's finest, turns out a complete auto wash in 15 minutes. Eight thousand cars a month are washed in it. Twenty cars can be handled at a time.

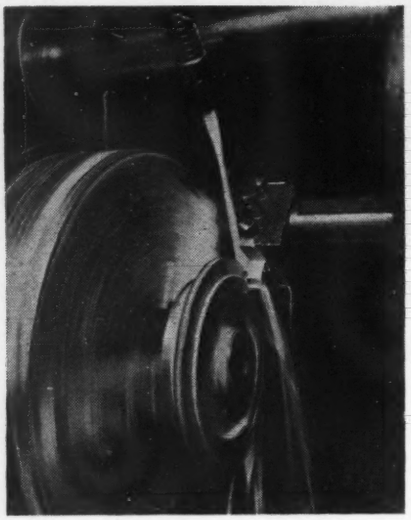
Eight-hour battery recharging service is rendered, with 75 cents as the charge. There are six pick-up and delivery cars including expert tow service.

In a large self-service style accessory shop is practically everything that adds to the pleasure, comfort and safety of driving. All of United Motors lines are carried, also complete marine equipment, a department that is very popular with the public and does a whale of a big business. Counters are eliminated in the accessory and marine departments. All merchandise is displayed in wall cases or on tables where patrons may handle, look, and make their own selections. Experienced men are on hand to answer questions and render assistance when it is desired.

Hundreds of dollars' worth of accessories are sold from displays in front of the colorful waiting room where serviced cars are delivered to owners. While waiting, patrons as a matter of course, examine items displayed and buy many things they would never have thought of asking for. High pressure sales methods are absolutely out in this station, but suggestive selling is used in a big way. And suggestive display is a powerful salesman, for no wall of resistance is built up against such salesmanship.

An excellent aid in selling radios

(*Continued on page 64*)



# Service Hints
## *From the Factories*

### Studebaker Overdrive

The question has been raised as to whether or not it is possible to move the low and reverse shift rail in the 1937 Studebaker President overdrive transmission without loosening the transmission from the clutch housing. The operation can be performed by sliding the rail forward and lifting the shift fork from the gear. The gear is then moved backward on the shaft. The shifter rail can be pulled back far enough to permit its removal from the clutch housing.

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### Cadillac-LaSalle Door Lock

On some of the earlier series of the 1937 La Salle and Cadillac 37-60 cars, difficulty has been encountered in a few cases where the key for the door handle lock fails to lock or unlock the door. This condition is due to the locking pawl in the inner end of the handle not engaging properly with the lug in the lock, or to the lug being somewhat out of position. The remedy for this trouble is installation of a new door lock with the second type lug and new pawl.

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### Ford Advises Inhibitor

In a recent Ford Service Bulletin it is stated that each time the radiator and cooling system are drained, it is imperative that an inhibitor be used. This inhibitor minimizes the rust and corrosive action in the cooling system. The constant use of rust inhibitor in the cooling system also reduces the tendency toward stoppage of radiator tubes due to excessive rust formation. Stoppage of radiator tubes naturally results in overheating and it is therefore extremely important that this be brought to the attention of all concerned so that owners will be informed accordingly.

### Olds Clutch

The clutch on 1937 Oldsmobiles is provided with an individual adjustment for each finger. When servicing clutch, whether it is installation of a clutch plate only, a clutch overhaul, or a replacement of parts, the fingers should be rechecked and reset to not more than .005 in. runout. For proper adjustment it is essential that a gage plate be used.

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### Buick Manifold Sections

If it becomes necessary to replace any one of the three exhaust manifold sections as used on the 1937 Buick series 60, 80 and 90, the slip joint on the old sections may be slightly out-of-round and, consequently, will not properly fit the new section. In order to obtain correct fit at the joint, valve grinding compound may be used to lap the two parts of the joint until a good sliding fit is obtained. The joint should not be filed or wire brushed to make them fit. This will remove too much stock and result in looseness.

---

### Studebaker Choke Markings

The information provided in the 1937 Studebaker Shop Manual concerning the adjustment of the choke to compensate for differences in fuels apparently has been overlooked in some cases, and owners have been unnecessarily penalized either in the way of poor performance or poor fuel economy during the warm up period.

Three markings (R, M and H) are provided on the case of the 1937 (Stromberg) choke controls which permit compensation for the wide range in volatility of the various brands of gasoline available.

The "R" setting is for use only with the lower grade fuels and, unless the owner is known to purchase such fuel regularly, this setting need not be used.

The "M" setting meets the requirements of the average summer grade fuel, and the "H" is ordinarily satisfactory for the standard brands of winter fuel and the high test grades of summer fuel.

The winter grade fuels supplied by a majority of leading oil companies are in the higher range of volatility and, with few exceptions, the choke adjustment can be set at "H" at this time of year. During the warm-up period, if there is any definite evidence of leanness, following such a setting, the adjustment can be moved slightly in the rich direction as required. When the oil companies change their standard brands of fuel to the summer grade, it is possible that the adjustment will have to be changed back to the "M" marking.

The importance of proper choke adjustment cannot be overstressed. In addition to the possibility of poor performance or poor fuel economy an excessively rich adjustment of the choke in cold weather may result in washing the lubricant from the cylinder walls during the warm-up period with consequent ring scuffing and excessive wear.

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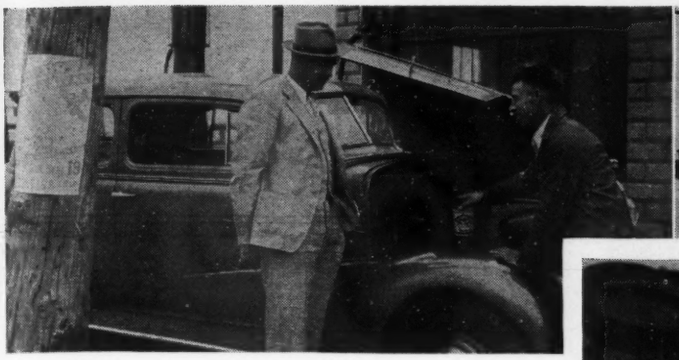
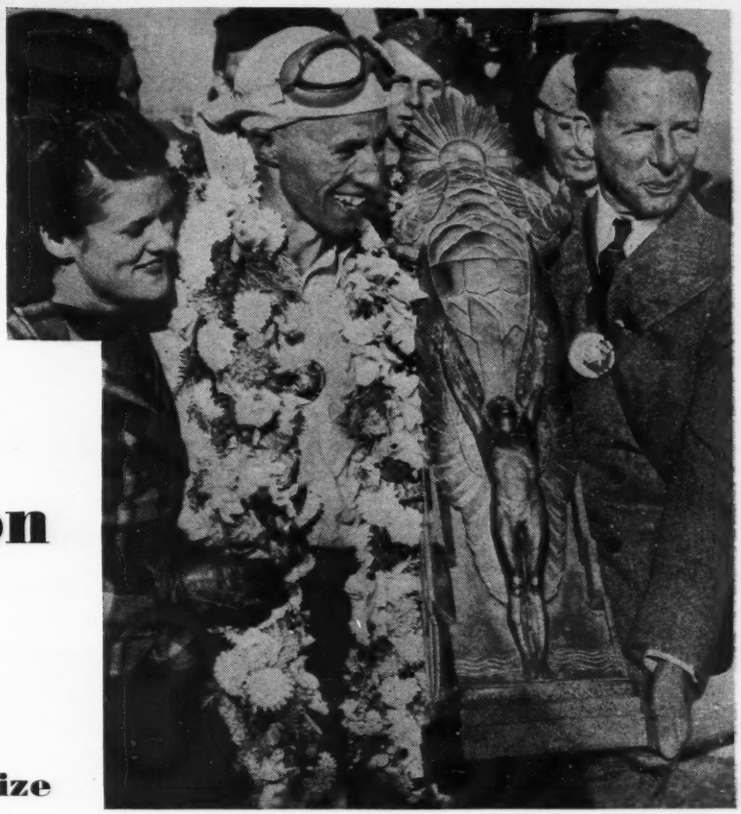
### Olds Transmission

When removing a transmission on a 1937 Oldsmobile it is necessary to first remove front propeller shaft. This is accomplished as follows: detach front end of both front and rear propeller shaft at companion flanges. Loosen intermediate bearing support from frame cross-members and remove front propeller shaft assembly.


*"Water for my horse, wipe off my spectacles and I'd like a road map, please."*





# Repairman Wins Thompson Trophy Race

## Rudy Kling nets $12,500 in prize money by winning Thompson and Greve events at Cleveland

**Illustrations show Rudy Kling and his wife receiving the Thompson trophy from F. C. Crawford, president of Thompson Products Co., also views of the Kling service station in Lemont, Ill.**

***By C. E. PACKER***

THE bullet-like nose of the "Pride of Lemont" built and flown to victory by Rudy Kling, Garageman of Lemont, Illinois, points upward these days with an air of justifiable pride.

It was not the nosing out of other ships alone in winning the Thompson Trophy offered by the Thompson Products Co., and the Greve Trophy that has brought distinction both to the town of Lemont and to Rudy Kling, but the fact that the winning ship was financed entirely out of his repair shop profits.

But let's start at the beginning.

It was eleven years ago that young Kling—he is only 28 now—met and maried his wife, Theresa. With her encouragement he went into the garage business for himself just 10 years ago.

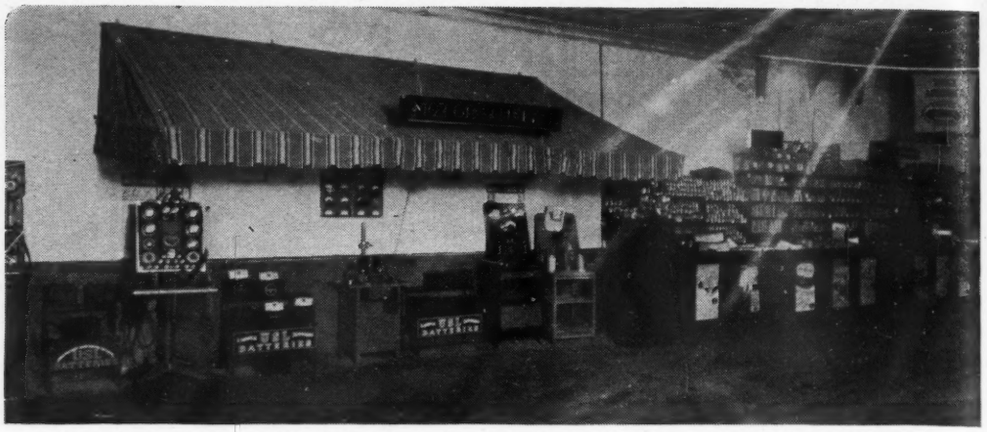
Their first garage was less than a mile from their present one which is located on highway 66 between Chicago and Joliet, the mail address being Lemont, though the town, proper, is quite a way to the south.

Sincere simplicity marks every action of the Kling family which consists of Rudy and Theresa and their nine year old son, who, however, will have nothing to do with flying though his daddy has tried repeatedly to "sell" him on the idea of learning to fly.

In order to build the business no extravagance has been indulged in, the Klings living in a small but most complete and homey little cottage. It is Mrs. Kling who cares for the flowers which surround their little home. But wise use of resources was not the only reason for the choice of living quarters. The cottage is within 100 feet of Kling's garage and his constant availability is probably one of the big reasons for his success in the garage business.

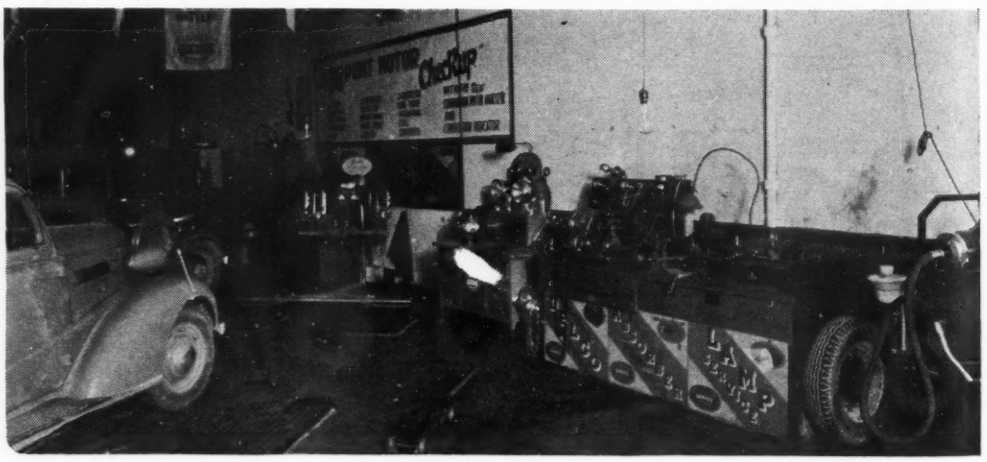
Joy riders do not always choose to go in the ditch between 8:30 A.M. and 5 P.M. but are more likely to make it 3 A.M. But no matter, Kling is on the job. And this type of work, both the towing and repairing, has bulked large in the Kling earnings.

*(Continued on page 82)*



# Let Your EQUIPMENT Do Two Jobs at Once

## By Capitalizing on the Sales Ability of Modern Shop Equipment



"TO the average car owner, a garage is just a grage; and all garages are about alike, except for the appearance of the front of the shop," says D. R. Spears, who, with his brother, R. L. Spears, owns Spears Garage, San Angelo, Texas. "Hence, it is up to the garage owner who really has the proper equipment to make his plant stand out from the average, to merchandise his equipment, even more than he does the garage itself.

"We try to make our equipment perform two distinct jobs. First, we use it to do reliable work at economical costs. Second, we use it as a consistent merchandising feature, to prove to the car owner that there *is* a big difference in garages; that it is the facilities the shop has to perform its services, not merely the front of the building, that constitutes a garage."

D. R. Spears manages the service department. He is the modern type of young mechanic who, by his training, education and modern outlook, is doing more than his share to take the independent garage out of the "back-yard" shop category and place it on a high business level, where it belongs. He started overhauling motors when he was ten years old and has been in the business of repairing automobiles consistently since. He is now thirty.

The garage does between $30,000 and $40,000 worth of business annually.

The owners merchandise their equipment both through advertising it consistently and by personal contact with customers on the floor. The interior of the shop is so laid out that the customer is aware of the modern equipment at his disposal, and it is easy for the service men to explain to the customer the methods used in testing and repairing.

When the garage installs a piece of new equipment, it advertises this fact in local papers, mentioning at the same time other major equipment available to car owners and stressing the necessity of the latest type of equipment to service, properly, the latest model cars.

"We remind customers and pros-

*(Continued on Page 82)*


**BILL TOBOLDT, Editor of MOTOR AGE, conducts the Readers' Clearing House. He presents some of the thousands of questions asked by readers of Motor Age together with a practical analysis of the difficulties in his replies. You, too, are cordially invited to send us your problems.**

## WANTED: MORE SPEED

*Help!! After ten years of trouble shooting, I'll have to admit I've met my Waterloo.*

*It's on a 1932 Studebaker 91 President that has been slow from the day it was broken in and with nothing but dinging on it ever since to bring it up to where it belongs, the darned thing is still slow. By slow I mean it won't do a mile over 70—up hill or down. To top things off, the car is my own and I bought it on the past performance of the same kind of cars I had worked on that would get out and trot, any of which would do 90 or better.*

*Stock, it had a 4:31 rear end, a 6:1 head. To try and get it to go, I made the following changes—put on a 7:1 head and a high lift camshaft (timing was changed accordingly to in. op. 15 deg. before T.D.C. but marks still were lined up as before). Another carburetor set up for this car was installed, a new distributor, coil and condenser, a new straight through muffler, spark plugs, big and small, but know they are O.K. from appearance, and as a last resort, spent $150 for a Miller super-charger and it still won't wind over 4000 r.p.m. by the tachometer, I also put on to keep track of its misdoings. And, last but not least, I put a 3:47 rear end under it along with the right speedometer gears and still no sale.*

*Here's its check-up dope: Compression, 150 all cylinders; cam timing, 15 deg. before T.D.C., .010 tappet clearance; spark now at 5 deg. before T.D.C., but has been tried in all positions; fuel pump, 2½ lb. and volume is O.K. Also, brakes clear; rear end and transmission grease, S.A.E. 160; motor oil, Penzoil S.A.E. 30; front end O.K.; chassis in line; tire, 40 lb.; plug gaps, .035; back pressure in muffler ¼ lb.; all electrical connections O.K. and the devil take the hindmost.*

*With the mileage at 40,000, I rebored it and put in the following: .020 over-size pistons, new valves, rods, mains, timing gears and piston rings, Clawson Bals silver cadmium rods, Borg Warner timing gear, in time O.K. and still no sale. All motor clearances are as follows: pistons, .004 in.; rods, .002 in.; lands, .020 in.; mains, .002 in.; pins, .00075; valves, .006 and .008 hot and running; valve guides, .0015; cam shaft, .002; endplay, .004 crank, .003 cam; ring gaps, .018.*

*I bored it thinking some clearances might be off, but I can assure you, it is no better.*

*If you can lay your finger on the jinx, Bill, you are a better man than I am for I have been looking for it since 1932 and haven't found it yet.*

*If you want any more dope on this set up, write me and I will try to fill the bill. H. H. Rose, Paramount Auto Service, 519 E. Superior St., Duluth, Minn.*

I CERTAINLY feel very much complimented that you should come to me for help on your Studebaker, for there is no doubt that you know your stuff and, from the work you have done on that car, you have left practically nothing for me to pin any guesses to.

First of all, you say the job winds up at 4000 r.p.m. If that's correct, and I assume that it is, I am going to make two guesses which will either make you want to kick me around the block, or yourself.

The guesses are: 1—That your speedometer is cockeyed and 2—That your clutch is slipping.

Now the basis for my guess is that if the engine turns up 4000 r.p.m. and you have standard 6:50 x 18 in. tires and a rear axle ratio of 3:47 to 1, the job would be going at a theoretical speed of 105 miles per hour. Allowing a few per cent for wheel slippage, etc., you should be going about 95 miles per hour. Therefore, you can see that either your speedometer reading is cockeyed or the clutch is slipping.

The first thing I would do would be to take the job out on a quiet, straight road and actually time myself with a stop watch over a measured distance and see what the answer is.

There is one thing that I am sure of and that is if that job turns up 4000 r.p.m. under load, you should get better than 95 miles per hour out of it.

On the other hand, if it does not wind up to 4000 under load, I'm sunk and don't have an intelligent guess to make unless you have a bad case of cylinder distortion which shows up as soon as the block get warm. Of course, you could tell that by looking at the pistons and noting the varying surface on the skirt and ring lands.

One other guess which I think is highly important and that is valve springs, particularly since you have

installed a high lift camshaft. With the high lift camshaft, your valve springs should have more pressure than usual and I would suggest that you get a new set of stiffer springs. Or, if you can't do that, make sure the ones you are using are up to standard.

Another point is your spark plug gap. You mention that the gap is .035 in. This is entirely too much for 150 pounds pressure and I would suggest that you drop it down to about .018 in.

*A more recent letter from H. H. Rose states that the clutch and speedometer are O.K. But he still has the new valve springs to try. If anyone has some suggestions, send them in.*

## How She Dances

*I have a 1934 Hudson, four door sedan, which has developed a bad shimmy ever since the axle-flex was exchanged for a solid axle. I have had this car on a new Bear wheel aligning machine and according to it, the axle required a 2 degree shim, which was put on. I have made sure that all joints are tight, replaced the tie rod arms, changed the tires and have done everything I could think of but it still has a bad tremble and shimmys at about 30 m.p.h. At about 50, it will lessen. M. G. Scism, Fishkill Plains Garage, Fishkill Plains, N. Y.*

THERE are several things that I would check on your 1934 Hudson that has developed a bad shimmy. First of all, I would make sure that the shock absorbers are filled and working correctly. The next thing I would do would be to balance the wheel and tire assembly so as to be absolutely sure that they are accurately balanced.

If this does not overcome your trouble, I would install an additional leaf in the front springs so as to increase their stiffness.

All this, of course, assumes that the caster, camber and toe-in and king pin inclination are correct. In this connection, it sometimes happens that through carelessness the readings are incorrectly made. However, I am inclined to think that you will find the trouble in the shock absorbers or in the balancing of the wheels.

Further in connection with the shock absorbers, I would also examine the rearshocks at the same time, as it sometimes happens that defective rear shock absorbers will cause a shimmy.

To further aid you in this trouble, I am sending you a reprint of an article on wheel aligning which I am quite sure you will find of interest.

## Carburetor Trouble

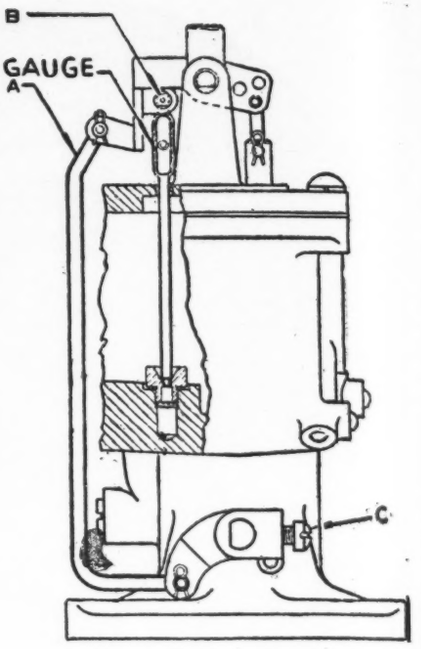
*I would like some information concerning a 1933 Standard Chevrolet. I cleaned carbon, ground valves, cleaned carburetor by blowing out jets with air, cleaned distributor and points and adjusted to about .018 in., adjusted valves to .006 in. and .008 in.*

*Since the job has been completed it has been run about 125 miles only averaging 12 miles to a gallon. Then I readjusted the carburetor float so there was better mileage when the car was heated up. I readjusted same back as before and mileage is the same. D. Edgar Kissinger, Kissinger's Garage, Shortsville, N. Y.*

THE first thing I would do on your 1933 Standard Chevrolet that is giving you only 12 miles per gallon, would be to check very thoroughly for intake manifold leaks and also for leaks around the intake valve stems.

Incidentally, the float height on this job should be ⅜ in., measured from the float cover to the top of the float when the assembly is held up-side-down.

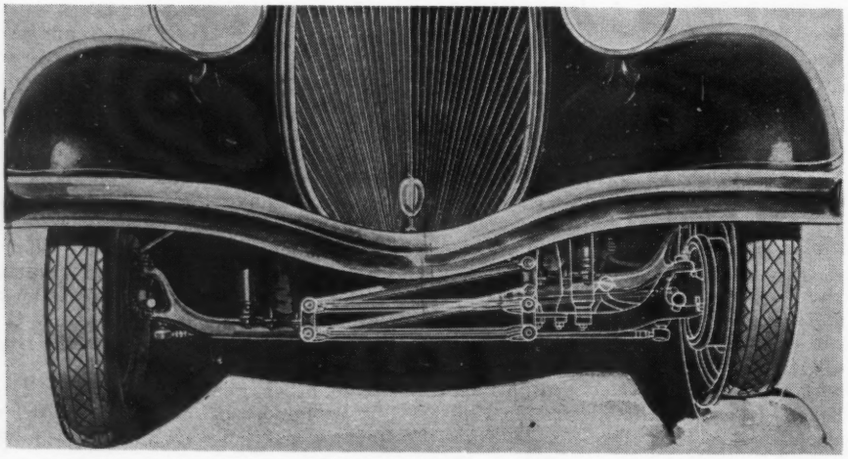
There is also a possibility that the trouble is in the metering rod setting. On all carburetor overhaul jobs, it is important that the metering rod be correctly set. This is done as follows: Back out throttle stop screw all the way and remove metering rod by turning it ¼ turn to release it from the pump arm. Then, insert a metering rod gage, Carter Part No. T109-20 in place of the metering rod, seating its beveled end in metering rod jet. Be sure and hold the gage vertical. Then, with the throttle fully closed, the metering rod pin in the pump arm should rest on top of the gage and upper end of connector rod should center freely in its hole in the pump arm. If it does not, bend the lower end of throttle connector rod until top end centers freely in its hole in the pump arm. Then, remove the gage and install the new metering rod.

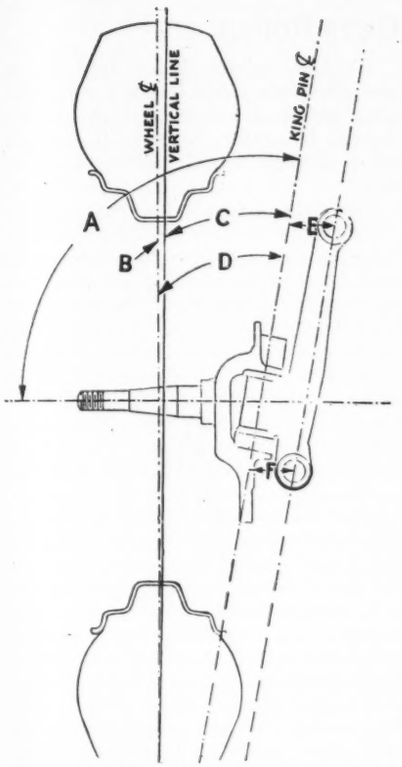



In general, the life of these metering rods is only around thirty to forty thousand miles and I think it would pay you to have the complete carburetor overhauled.

## Bent Knuckles

*A man drove a Plymouth 1935 P.J. into my shop to have the front wheels aligned because the left front tire was wearing unevenly on the sides. The king pins and bushings were worn so I sold him a king pin and bushing job. After taking out the spindles, I checked the king pin inclination from the axle which was 8½ deg. Then I checked the steering knuckles and found them both bent. Now here is the way I check steering knuckles. I have a rod fitted with two adjustable cones which I put through the knuckle in place of the king pins after the old bushings are removed. Then, the knuckle is put into the hub of one of the front wheels with bearings and fastened with the nut. This assembly is then placed in a vice. The wheel is set vertical with a Bendix caster and camber gage. In other words, the wheel is set to zero camber. Then the gage is placed on*






*the rod which takes the place of the king pin.*

*The reading obtained will be the included angle which is camber plus king pin inclination which for this car, according to my specifications, should be 8½ deg. plus ½ deg. or 9 deg. The reading I got was 10½ deg. on one and about 10¼ deg. on the other. I then sent out to the Chrysler Motors Parts Corp. of New York City for two new knuckles, part numbers of which are 633670 and 633671.*

*Checking the new knuckles in the same manner, the included angle was 10 deg. when it should be 9 deg. I didn't have time to go into any further investigation so I installed the new knuckles with new king pins and then checked the camber. The camber was 1½ deg. out and king pin inclination 8½ deg.*

*I don't understand what can be wrong. Is it that my specifications are wrong or is it that they gave me the wrong steering knuckles? Casimir G. Dudziec, Cass' General Auto Repairs, Railroad Ave., and Third St., Ridgefield Park, N. J.*

I AM very much interested in the steering problem you are having on the 1935 Plymouth. There is certainly nothing wrong with the way you checked the included angle. Furthermore, the knuckles you obtained are correct according to the parts numbers. The specifications you have are also correct—that is, 8½ deg. king pin inclination; ½ degree camber; 2 degrees caster and 0 to ⅛ in. toe-in.

As I see it, either the new knuckles are wrong or you have made an error in making the measurements. In this connection, it is not impossible that your gage, through wear, may be inaccurate. I would suggest that you check it with a gage that you know to be correct.

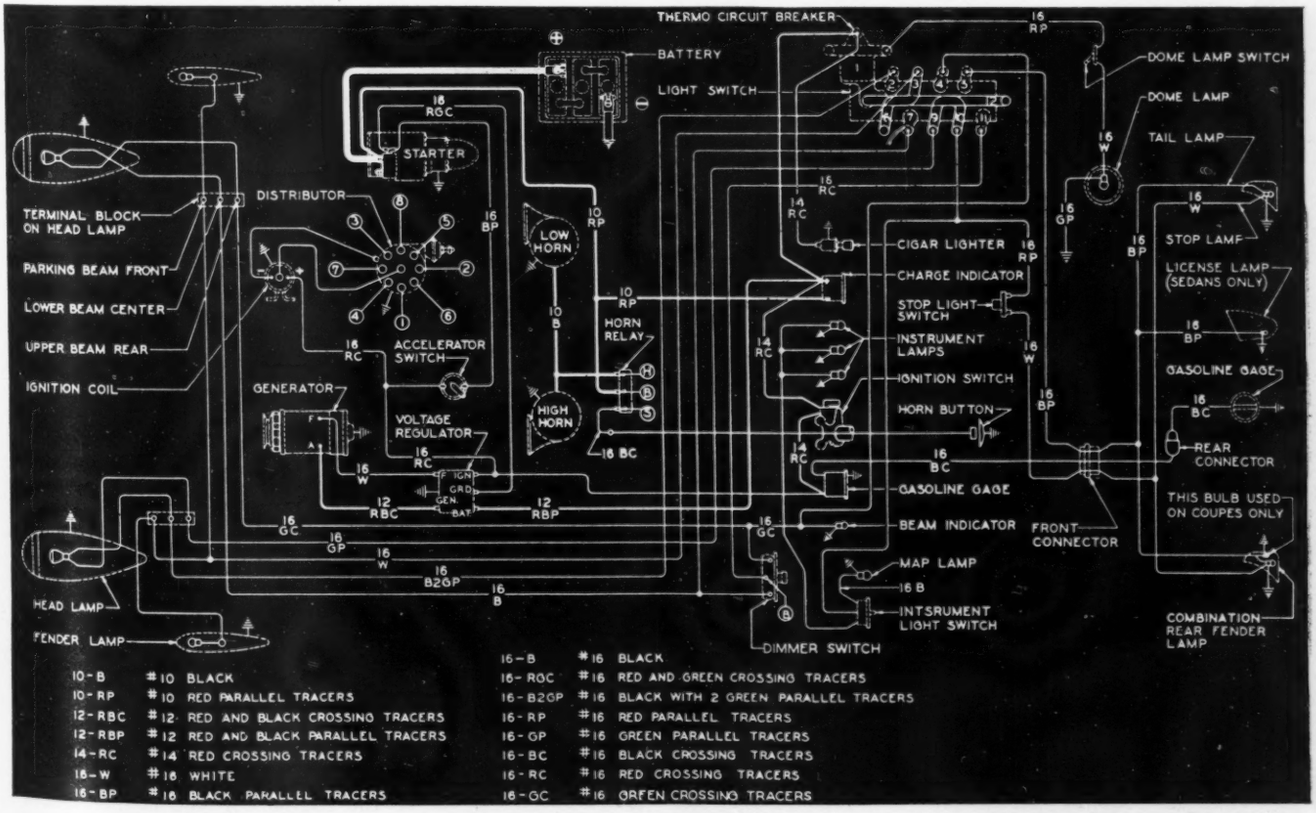
There is one thing sure and that is that there is one degree error somewhere and whether it is in the knuckles or in your gage, I can't say.

## Stubborn Knock

*I have a Chrysler 66 that has given me considerable trouble. When I got this car to service it, it had a dull knock when idling. Then, new rings were installed and bearings checked and apparently everything was O.K. When motor was warmed up, our old knock was right back in there "doing its best."*

*The owner was by this time getting disguested, so I pulled the motor out and went through it checking everything. I bored the block .020 in. oversize and installed new pistons, rings and pins. Aligned the rods, adjusted all bearings, put in new oil pump gears and timing gears. Checked oil pressure and found oil was escaping too fast through center camshaft bearings. I plugged these and put a hole the size of a common pin in the center two bearings and ⅛ in. hole in the rear bearing. Then, after assembling my "perfect job," it still retained this dull knock at low speed when motor is warm, or when oil is light.*

*By-pass valve seems to function properly but gage flutters as though oil were escaping in spurts at regular intervals. I am at my wit's end with this automobile and if you could aid me in any way, it would be greatly appreciated.*




**Wiring diagram for 1937 Buick "40"**

*Yesterday, oil pressure dropped to 0 and back to 30 and 40 several times. I can't understand it. The oil pressure is about 20 lbs. lower at 5 m.p.h. than it used to be. The noise stops when you have the engine idling and put it in high gear and pull it and, of course, the motor runs slower than it did when it was idling. A. J. Hankinson, Jerry's Auto Service, Highway 12, N. Menomonie, Wis.*

I AM not quite sure, from your letter with reference to the trouble you are experiencing with a Chrysler 66, whether you have made an oil pressure test on this engine. If you have not, I would certainly advise doing so. Details of this test are given in an article which I am sending you.

This test will enable you to determine just which bearings are losing oil and also those which are not receiving sufficient oil.

After making the test, replace any bearings that may be losing oil and clean any oil lines that may prove to be clogged.

In addition, I would suggest that you check end-play of both the crankshaft and camshaft. If the end-play is in excess of .006 inch, new bearings should be installed.

I would also suggest that you carefully go over the engine foundation bolts to make sure that they are O.K. and also that the flywheel is not loose.

Another suggestion is that you remove the oil line to the oil pressure gage and blow it out throughly with air so as to be absolutely sure that it is clear. Also, check the oil gage itself, as that might be defective and result in the erratic oil pressure readings you are getting.

---

## Grease Leak

*As a reader of* Motor Age, *I would like for you to tell how to stop a grease leak at the universal ball cap on a 1931 Buick 8-66 series. It will leak out two pounds of grease in one thousand miles of driving. An Indiana Subscriber.*

TO overcome the grease leak at the universal ball cap on a 1931 Buick 8-66, it will be necessary to replace the bushing at the front end of the torque tube.

You will undoubtedly find that this bushing is badly worn and that replacing it will overcome your trouble.

---

## Horn Harmony

*Will you please tell me how and where to fix the horn on a 1937 Plymouth? Fred E. Haynes, Haynes' Garage, Burney, Calif.*

FIRST of all, to remove these horns, remove the radiator splash pan, which will then permit the removal of the horn and horn bracket as a unit.

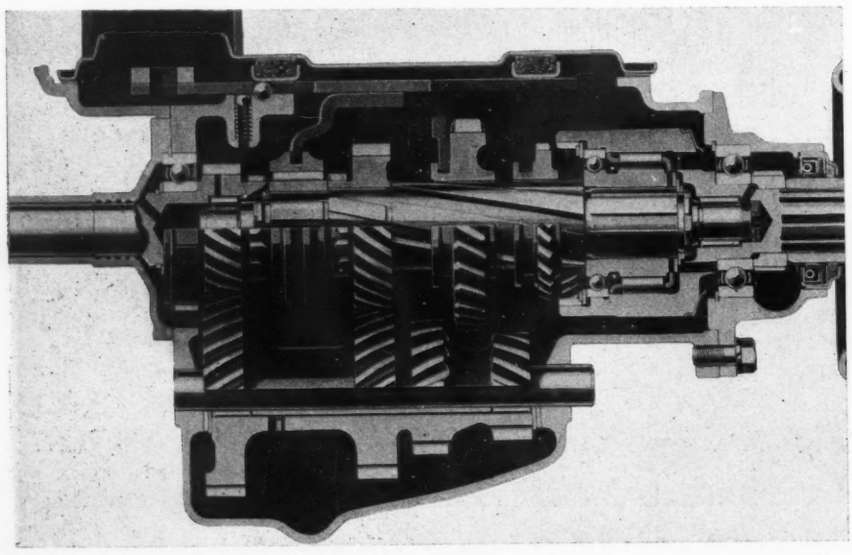
To adjust, clamp rubber insulated bracket and horn tightly in a vise. Remove back shell of horn by taking out the cover screw. That is, if it is on a model T-4 Plymouth. On the Model T-3, the adjusting screw and lock nut are located off-center on rear of horn cover. Loosen the lock nut and turn the adjusting screw. Incidentally, the adjustment is very fine and it is only necessary to turn the nut a slight amount at each trial.

---

## Glad to Help

*Will you please send me an illustration of the* 1933 *Dodge transmission as it will assist me in repairing that unit? Ralph B. Mickey,* 46 *LaBelle Avenue, Highland Park, Mich.*

IN accordance with your request, the illustration of the transmission used on the 1933 Dodge is shown.



## Gets Rough

*We have in our shop a 1935 Standard Chevrolet that has a rough running motor, or perhaps I should say it runs irregular, flutters. It does not seem to miss on any particular cylinder.*

*The first time the car came in our shop the owner told us the valves had been ground a day or two before and that is when the missing occurred. We checked the motor carefully and found everything O.K., compression tested 96 lb. average per cylinder. We then decided it was air leakage around the valve stems but on removing cylinder head found the valve stems and guides were in good condition. The valves were reseated and the head installed on the motor, it was then run, warmed up and the valves adjusted to .006 in. per intake and .013 in. per exhaust, but it still missed. Rechecking back on the ignition system, we replaced the coil, condenser, breaker points, distributor cap, rotor button, ignition wires and spark plugs. We also tried different heat ranges in spark plugs and varied the gap from .025 to .040. The carburetor was carefully checked and other carburetors tried but to no avail. The valve timing was checked and found to be O.K. but after removing the camshaft and valve lifters we found the lobes on the shaft rough and the lifters cupped out and rough.*

*A new camshaft and valve lifters have been installed. The manifolds carefully checked for cracks or air leaks, the muffler removed and the motor still fires irregular. A vacuum meter on the motor reads 19 in. at idle and 20 in. at 25 m.p.h. Only one thing have I found that partly helps to smooth the running is to adjust the valves to .015 intake and .025 exhaust. but this makes them rather noisy. The rocker arms were checked to see if they were sticking but were O.K. The car has had good care and has 18,424 miles on the speedometer.*

*I am a very enthusiastic reader of "Motor Age." What would you suggest we do or what have we overlooked? I have tried to make this letter brief as possible but rather hard to include details. J. B. Chapman, Walsh Auto Service, 2907 North Ave., Richmond, Va.*

YOU certainly have done a very thorough job on that 1936 Standard Chevrolet in an endeavor to overcome the irregular running.

However, in addition to the work you have already done, there are several things that occurred to me that I think would be worth checking. First of all, there is a possibility of a crack between the intake and the exhaust manifolds which would give you the same effect as a burned heat riser on a Buick car. I suggest that, if it is possible, you obtain a manifold from another job and try it out and see if it improves the operation of the engine. If you cannot secure another manifold be sure and check

carefully for the crack at this point.

There is also a possibility of a crack between the intake and exhaust ports in the engine block itself and while this is pretty hard to discover, I would go over the ports very carefully so as to be absolutely sure that this is not the case.

Another important point is worn distributor gears and worn distributor shaft bushings. While you have checked the distributor very thoroughly you have not mentioned checking these two points and, if you have not already done so, I would strongly advise making a check to see that they are O.K.

Furthermore, if this is what is known as a Special Fleet Economy engine the spark plug gap should be adjusted to .040 in., intake tappet clearance to .010 in. and the exhaust valve clearance .016 in. In connection with the tappet clearance, I think it might be advisable to connect a vacuum gage to the manifold and then adjust the tappets so as to obtain a maximum reading.

I would also suggest that you check the valve spring pressures and if these are low, it would be worth while installing new springs.

However, I am more inclined to believe that the trouble lies in the distributor, that is, worn gears or bushings, or in a cracked manifold or a crack between the exhaust and intake ports.

## More Knocks

*I am writing you in regard to a 1935 Pontiac Six which has a knock in it at speeds around 30 miles and up. One garage pronounced it loose rods, another was sure it was main bearings and I thought so myself but I checked the crankshaft balancer first and after taking all four lower main bearing caps down, I changed my mind. All these bearings were perfect and the motor carries the same oil pressure it did when new—30 lb. when running.*

*After checking the main bearing caps, I discovered the timing chain was very badly worn so I installed a new one. Checked crankshaft and camshaft gears for looseness on shafts, also end play and I placed a .004 in. paper shim between the crankshaft and second main bearing cap and this held shaft so tight I could not turn same by taking hold of flywheel with both hands. This also was my way of checking flywheel looseness, also bearing clearance.*

*After assembling job the knock seemed to be gone but after driving car around 100 miles, it seems to be just the same as before. Could it be possible that the upper main bearing could be bad and the lower halves so good and still maintain oil pressure?*

*What is your suggestion regarding this knock? I. L. Thiel, I. L. Thiel's Garage, Derrick City, Pa.*

ONE thing you didn't check on your 1935 Pontiac Six which has a knock at speeds around 30 m.p.h., is the engine supports. I would check these over carefully and make sure that they are O.K. It might also pay to check the radiator core to make sure that it is secure.

When you checked for loose rods, did you also check to make sure that one of the rods were bent? This is very important and if you have not done so, I would take the oil pan down and then crank the engine slowly by hand while another mechanic views the rods from below. If the rods are bent, they will move back and forth along the wrist pin, striking the piston bosses.

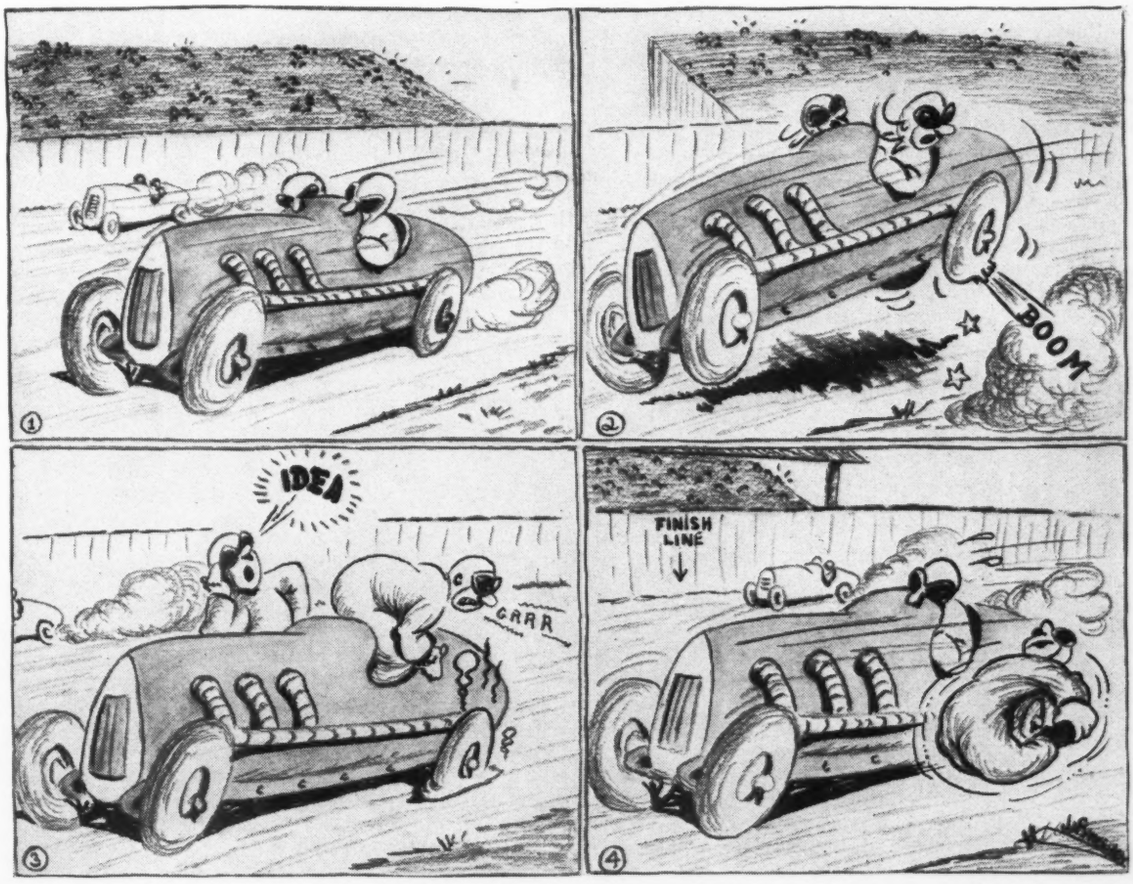
It is also possible that the knock is caused by defective upper main bearing halves. The best way of checking this would be to make an oil pressure test on the bearings, details of the test are being sent to you, under separate cover.

## An Extra Copy

*Enclosed please find twenty-five cents in coin for which I would like to get an extra copy of the April issue of* Motor Age.

*I have received my copy but would like an extra one. Art Jackson, 212 Platt St., Eau Clair, Wis.*

THE copy is in the mail.



THESE are practical merchandising ideas that have been used by maintenance men — just like yourself. Workable ideas gathered from here, there and everywhere and presented for practical application to your business. Use them and write us your experience for publication herein.

# SELLING


## Lucky License Plan Ups Sales

A NEW promotional plan advertised as the "Lucky License Pay-Off" by the Pennsylvania Independent Oil Co., Easton, Pa., has been an excellent business booster and has increased gasoline gallonage at the average rate of 20 per cent per week for four weeks and increased income from lubrication and other services by 47 per cent during the first month.

The plan operates as follows: The company has secured the license numbers of all motor vehicles in the territory served by its two stations. Each number is entered on a separate slip of paper and placed in a large wire basket. Any other license numbers will be placed in the basket upon request.

Every Monday one of these numbers is drawn from the basket. The number is then posted at the two service stations, and if the holder of that license number comes to either station within 24 hours after the drawing he can claim the "Pay-Off," which amounts to $25 or more, providing he has a qualifying card on which that number has been entered by the station attendant.

Qualifying cards are issued to all car owners driving to the stations. It is not necessary to purchase anything to receive one of the cards, but the qualifying card must be renewed each week if the holder wants to be eligible for any of the weekly awards. Each qualifying card has ten spaces to cover a period of ten weeks. When the owner presents his card at the station the attendant punches the card in the proper space to indicate that the card has been renewed and the holder is eligible for the current week's award.

If the weekly award is not claimed within 24 hours, the amount will then be added to the following week's award, thus increasing the amount by $25 per week until a maximum of $125 has been reached. When the maximum of $125 has been reached without being claimed, a drawing will be held each day thereafter until the award has been made.

The plan has been advertised by house-to-house distribution of circulars, newspaper copy, and presentation of qualifying cards to all customers entering the station.

The company had two objectives in view when adopting this plan: an immediate increase in volume, which has been accomplished; and to get more car owners into the habit of stopping regularly at its stations, which it believes can be accomplished by this type of promotion.

## Can You Close?

MORE Finnesse! That's what a recent survey, by students of the University of Oregon, finds is needed in closing service and merchandise sales. Out of 501 service salesmen, who were "shopped," only 30 per cent knew the gentle art of closing, 75 per cent of the fellows knew how to approach a customer, 54 per cent knew their product, 35 per cent could answer objections but damn few could get far enough to play a pretty tune on the old cash piano.

There's no secret to the science of closing—just adapt the sales fundamentals, used by successful closers on the front lines, to your own methods and personality. Here are ten good suggestions—

1. The attitude of "Just waiting on a customer" kills many a sale. Start the interview with thoughts of a successful close foremost in your mind.

2. Build to the close with facts, not arguments—make the customer see what the new equipment or service will DO FOR HIM.

3. Emphasize investment—minimum cost over a period of time or miles—to overcome the argument that the

*By Harry T. Cooley*

# SERVICE

equipment is too expensive.

4. *Don't* say "Ya gotta get a new battery" — instead — "A new Blank battery will give your car new life, because——" then, give him the Facts.

5. Ask questions which require a "Yes" answer, such as—"You want your spark plugs to make the most of your gasoline, don't you?" The answer is always "Yes" if you've given him the proper Fact build-up.

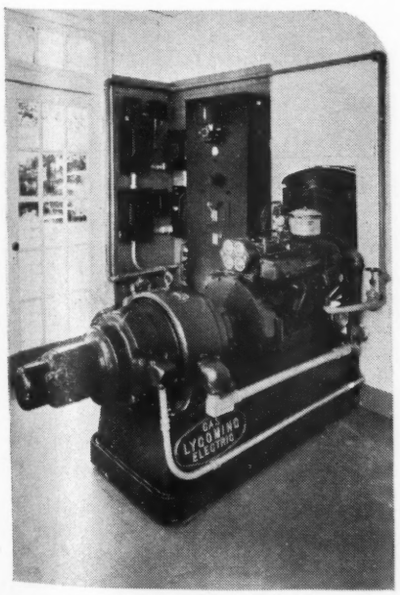
6. "When I get a customer's hand wrapped around an article—*I've sold him,*" says a sales contest winner. Try it yourself—let the article do some of the selling.

7. "I can have them installed while you wait—it will only take a few moments." The idea of IMMEDIATE POSSESSION is the best closing point of all, but be sure he knows the Facts before you use it.

8. Mention of a prominent user of the product or service is another good form of closing appeal.

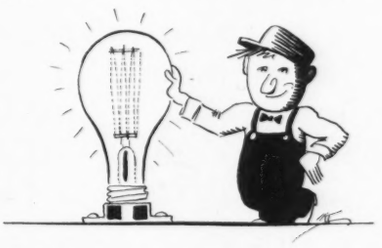
9. *Don't Knock Competitors!* you'll lose the most important sales asset you have—the customer's confidence.

10. Start your sale by showing the best item and work down IF NECESSARY. It won't work the other way around.




## Selling Service With Light

THE successful service station owner knows the importance of a brilliantly lighted station. Floods, spectaculars, neons, are one of his best mediums for bringing customers in, and when he can have all the light he needs at an extremely small cost, he knows that he is actually putting dollars into his cash register. The above photo shows Fritchley's Service Station at 5975 South Main Street, Los Angeles, California, which has installed a 10 K.W. Lycoming Natural Gas electric generating unit to make its own electric light and power. The owners have found that they can make their own electric light and power for less than one cent per kilowatt as against three cents a kilowatt for purchased current.



## A Neighborhood Garage With Big Ideas

THE Pellissier Square Garage, Los Angeles, is a neighborhood garage with big-time ideas which result in excellent business for both service and storage departments and proves that location does not act as a handicap when the alert garage will make the most of it.


Making the most of the location is a specialty with this firm. In fact, the success experienced is based on the fact that the garage confines its activities to within a ten-block area. Concentration is what has produced the results. They "keep tabs" on all the changes of residence and see to it that newcomers know of their service. Concentration makes selling easier; it also cuts down promotional and solicitation costs.

Hand written letters by either of the two partners, who manage the garage, have been found the most effective type of direct mail business-builders. The personally written letter has the right neighborhood touch and although more expensive to produce, will be read in more cases than a form or typed letter.

One sale builds another; whenever a car comes in for any type of service the owner is sent an appreciation letter, inviting him to come in for future service, but most especially thanking him for his patronage. That approach builds good-will.

The striking sign illustrated above may be seen for blocks and is considered a most powerful advertising factor. The garage has another large electric sign mounted on the roof, which may be seen from a distance of about five blocks in the other two directions. These constantly remind the the covered neighborhood of the garage; they back up solicitation and direct mail and thus have a great secondary value.

# Anti-Freeze

## Quarts of Anti-Freeze Required

**(With Specific Gravity of Solutions at 60° Fahr.)**

### TEMPERATURE EXPECTED (FAHR.)

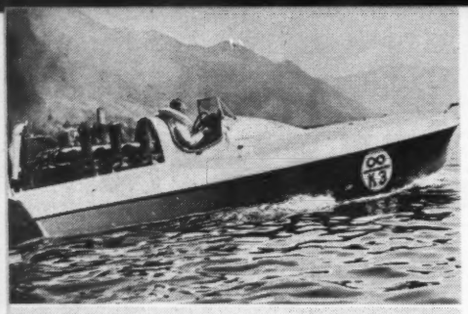
| Cooling System Capacity in Qts. | 20° ABOVE | | | 10° ABOVE | | | | ZERO | | | | 10° BELOW | | | | 20° BELOW | | | | 30° BELOW | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *ALCOHOL Sp. Gr. .9780 | E. GLYCOL Sp. Gr. 1.00 | METHANOL 100% | *ALCOHOL Sp. Gr. .9700 | GLYCERINE Sp. Gr. 1.080 | E. GLYCOL Sp. Gr. 1.040 | METHANOL 100% | *ALCOHOL Sp. Gr. .9600 | GLYCERINE Sp. Gr. 1.108 | E. GLYCOL Sp. Gr. 1.050 | METHANOL 100% | *ALCOHOL Sp. Gr. .9500 | GLYCERINE Sp. Gr. 1.120 | E. GLYCOL Sp. Gr. 1.060 | METHANOL 100% | *ALCOHOL Sp. Gr. .9400 | GLYCERINE Sp. Gr. 1.130 | E. GLYCOL Sp. Gr. 1.065 | METHANOL 100% | *ALCOHOL Sp. Gr. .9200 | GLYCERINE Sp. Gr. 1.144 | E. GLYCOL Sp. Gr. 1.070 | METHANOL 100% |
| 6 | 1¼ | 1 | ¾ | 1¾ | 3 | 1½ | 1¼ | 2½ | 4 | 2¼ | 1½ | 2¾ | 4½ | 2½ | 2 | 3 | 4¾ | 2¾ | 2¼ | 3¾ | 5½ | 3 | 2½ |
| 7 | 1½ | 1¼ | ¾ | 2¼ | 3½ | 1¾ | 1½ | 2¾ | 4½ | 2½ | 2 | 3½ | 5¼ | 3 | 2¼ | 3½ | 5½ | 3¼ | 2¾ | 4¼ | 6½ | 3½ | 3 |
| 8 | 1½ | 1½ | 1 | 2½ | 4 | 2 | 1¾ | 3¼ | 5½ | 2¾ | 2¼ | 4 | 6 | 3¼ | 2½ | 4 | 6½ | 3½ | 3 | 5 | 7¼ | 4 | 3½ |
| 9 | 1¾ | 1¾ | 1¼ | 2¾ | 4½ | 2¼ | 2 | 3½ | 6 | 3 | 2½ | 4½ | 7 | 3½ | 3 | 4½ | 7¼ | 4 | 3½ | 5½ | 8 | 4½ | 3¾ |
| 10 | 2 | 1¾ | 1¼ | 3 | 5 | 2½ | 2 | 4 | 6½ | 3½ | 2¾ | 4¾ | 7½ | 4 | 3¼ | 5½ | 8 | 4½ | 3¾ | 6 | 9 | 5 | 4¼ |
| 11 | 2¼ | 2 | 1½ | 3½ | 5½ | 2¾ | 2¼ | 4½ | 7¼ | 3¾ | 3 | 5¼ | 8½ | 4½ | 3½ | 5¾ | 9 | 5 | 4¼ | 6½ | 10 | 5½ | 4½ |
| 12 | 2½ | 2¼ | 1½ | 3¾ | 6 | 3 | 2½ | 4¾ | 7¾ | 4¼ | 3¼ | 5½ | 9 | 4¾ | 4 | 6½ | 9½ | 5½ | 4½ | 7½ | 11 | 6 | 5 |
| 13 | 2½ | 2½ | 1¾ | 4 | 6½ | 3¼ | 2¾ | 5¼ | 8½ | 4½ | 3½ | 6 | 10 | 5¼ | 4¼ | 7 | 10½ | 6 | 5 | 8½ | 11½ | 6½ | 5½ |
| 14 | 2¾ | 2½ | 1¾ | 4½ | 7 | 3½ | 3 | 5½ | 9 | 5¼ | 3¾ | 6½ | 10½ | 5½ | 4½ | 7½ | 11 | 6½ | 5¼ | 9 | 12½ | 7 | 6 |
| 15 | 3 | 2¾ | 2 | 4½ | 7½ | 3¾ | 3 | 6 | 9¾ | 5½ | 4 | 7 | 11½ | 6 | 5 | 8 | 12 | 6¾ | 5¾ | 9½ | 13½ | 7½ | 6½ |
| 16 | 3¼ | 2¾ | 2 | 4¾ | 8 | 4 | 3¼ | 6½ | 10½ | 5¾ | 4¼ | 7½ | 12 | 6½ | 5¼ | 8½ | 13 | 7¼ | 6 | 10 | 14½ | 8 | 6¾ |
| 17 | 3½ | 3 | 2¼ | 5¼ | 8½ | 4¼ | 3½ | 6¾ | 11 | 6 | 4½ | 8 | 13 | 7 | 5½ | 9 | 13½ | 7½ | 6½ | 10½ | 15½ | 8½ | 7¼ |
| 18 | 3¾ | 3¼ | 2¼ | 5½ | 9 | 4½ | 3¾ | 7¼ | 11¾ | 6¼ | 4¾ | 8½ | 13½ | 7¼ | 6 | 9½ | 14½ | 8 | 6¾ | 11 | 16 | 9 | 7½ |
| 19 | 4 | 3½ | 2½ | 5¾ | 9½ | 4¾ | 4 | 7½ | 12½ | 6½ | 5 | 9 | 14½ | 7½ | 6¼ | 10 | 15 | 8½ | 7¼ | 11½ | 17 | 9½ | 8 |
| 20 | 4 | 3½ | 2½ | 6 | 10 | 5 | 4¼ | 8 | 13 | 7 | 5½ | 9½ | 15 | 8 | 6½ | 10½ | 16 | 9 | 7½ | 12 | 18 | 10 | 8½ |
| 21 | 4¼ | 3¾ | 2¾ | 6½ | 10½ | 5¼ | 4¼ | 8½ | 13½ | 7½ | 5¾ | 10 | 16 | 8½ | 6¾ | 11 | 17 | 9½ | 8 | 13 | 19 | 10½ | 9 |
| 22 | 4½ | 4 | 2¾ | 6¾ | 11 | 5½ | 4½ | 8¾ | 14½ | 7¾ | 6 | 10½ | 16½ | 8¾ | 7¼ | 11½ | 17½ | 10 | 8¼ | 13½ | 20 | 11 | 9¼ |
| 23 | 4½ | 4¼ | 3 | 7 | 11½ | 5¾ | 4¾ | 9¼ | 15 | 8 | 6¼ | 11 | 17½ | 9¼ | 7½ | 12 | 18½ | 10½ | 8¾ | 14 | 21 | 11½ | 9¾ |
| 24 | 4¾ | 4¼ | 3 | 7¼ | 12 | 6 | 5 | 9½ | 15½ | 8½ | 6½ | 11¼ | 18 | 9½ | 8 | 12½ | 19 | 10¾ | 9 | 14½ | 21½ | 12 | 10 |
| 25 | 5 | 4½ | 3¼ | 7½ | 12½ | 6¼ | 5¼ | 10 | 16½ | 8¾ | 6¾ | 11½ | 19 | 10 | 8¼ | 13 | 20 | 11¼ | 9½ | 15 | 22½ | 12½ | 10½ |
| 26 | 5¼ | 4¾ | 3¼ | 7¾ | 13 | 6½ | 5¼ | 10½ | 17 | 9 | 7 | 12 | 19½ | 10½ | 8½ | 13½ | 21 | 11¾ | 9¾ | 16 | 23½ | 13 | 11 |
| 27 | 5½ | 5 | 3½ | 8¼ | 13½ | 6¾ | 5½ | 11 | 17½ | 9½ | 7¼ | 12½ | 20 | 11 | 8¾ | 14 | 22 | 12 | 10¼ | 16½ | 24½ | 13½ | 11½ |
| 28 | 5¾ | 5 | 3½ | 8½ | 14 | 7 | 5¾ | 11¼ | 18¼ | 9¾ | 7½ | 13 | 21 | 11¼ | 9¼ | 14½ | 22½ | 12½ | 10½ | 17 | 25 | 14 | 11¾ |
| 29 | 5¾ | 5¼ | 3¾ | 8¾ | 14½ | 7¼ | 6 | 11¾ | 19 | 10 | 8 | 13½ | 22 | 11½ | 9½ | 15 | 23½ | 13 | 11 | 18 | 26 | 14½ | 12¼ |
| 30 | 6 | 5½ | 3¾ | 9 | 15 | 7½ | 6¼ | 12 | 19½ | 10½ | 8¼ | 14 | 22½ | 12 | 9¾ | 15½ | 24 | 13½ | 11¼ | 18½ | 27 | 15 | 12½ |
| 31 | 6¼ | 5¾ | 4 | 9½ | 15½ | 7¾ | 6½ | 12½ | 20 | 10¾ | 8½ | 14½ | 23½ | 12½ | 10 | 16 | 25 | 14 | 11¾ | 19 | 28 | 15½ | 13 |
| 32 | 6½ | 5¾ | 4 | 9¾ | 16 | 8 | 6½ | 13 | 21 | 11¼ | 8¾ | 15 | 24 | 13 | 10½ | 16½ | 26 | 14½ | 12 | 19½ | 29 | 16 | 13½ |

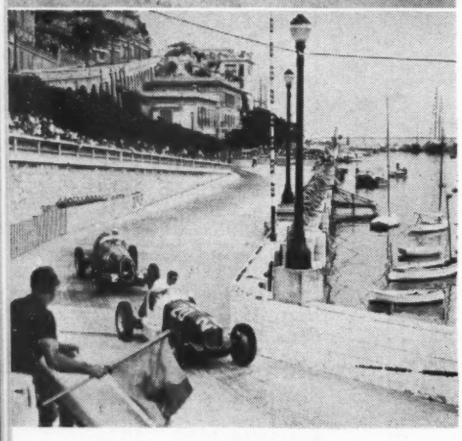
To determine the amount of anti-freeze required for any car, find the cooling system capacity of the car in question in the table at right. Then by selecting the corresponding figure in the first column in the table above, the amount of any anti-freeze for the temperature expected may be found by following the column across the page. *The alcohol listed in the chart corresponds to 188 proof. When alcohol of 200 proof is used, reduce the amounts listed in the table by 10 per cent.

# Facts and Figures

## Cooling System Capacities by Makes and Models

| | Quarts |
|---|---|
| **AUBURN** | |
| 6, 1929, 1930 | 19 |
| 8-90, 8-95, 1929, 1930 | 22 |
| 120, 125, 1929, 1930 | 25 |
| 8-98, 1931 | 21 |
| 8, 1932, 1933 | 19 |
| 6-52, 1934, 1935 | 17½ |
| 8-50, 1934, 1935 | 21 |
| 12, 1932, 33, 34 | 37 |
| 6-654, 1936 | 16 |
| 8-852, 1936 | 20 |
| **AUSTIN** | |
| 1931 to 1936 | 6 |
| **BUICK** | |
| Master, 1926-27 | 18 |
| 115, 1928 | 16 |
| 116, 40, 1928, 1929, 1930 | 17 |
| 120, 128, 1928 | 20 |
| 121, 129, 1928-29 | 22 |
| 50, 60, 1930 | 22½ |
| 40, 1930 | 17 |
| 8-50, 1930 to 1933 | 12 |
| 8-60, 1930 to 1933 | 16 |
| 8-80, 8-90, 1930 to 1933 | 19 |
| 40, 1934 | 14 |
| 50, 1934, 1935 | 15½ |
| 60, 1934, 1935 | 18 |
| 90, 1934, 1935 | 23 |
| 40, 1935 | 13 |
| 40, 1936, 1937 | 13¼ |
| 60, 80, 90, 1936-37 | 17 |
| **CADILLAC** | |
| 341A, 341B, 355, 353 | 24 |
| 452, 1930, 31 | 28 |
| 370, 1931 | 26 |
| 8, 1932, 33 | 26 |
| 12, 1932, 1933 | 24 |
| 16, 1932, 1933 | 28 |
| 355-D, 1934, 1935 | 20 |
| 370D, 1934, 1935 | 19 |
| 452-D, 1934, 1935 | 23 |
| V8-60, 1936 | 30 |
| V8-70, 75, 1936 | 29 |
| V12-80, 85, 1936 | 19 |
| V16-90, 1936, 37 | 24 |
| V8-60, 65, 70, 75, 1937 | 25 |
| V12-85 | 17 |
| **CHEVROLET** | |
| 1926, 1927, 1928 | 8 |
| 1929 to 1933 | 10 |
| Std. 1934, 1935 | 10 |
| Master 1934, 1935 | 11 |
| Std. & Master, 1936 | 15 |
| Std. & Master, 1937 | 14 |
| **CHRYSLER** | |
| 52, 66, 1929 | 14 |
| 60, 1926 | 12 |
| 62 | 11 |
| 70, 1925, 26, 27 | 16 |
| 72 | 17 |
| 80, 1926, 1927 | 20½ |
| 65 | 13 |
| 75 | 15 |
| 70, 77 | 21 |
| Imp. 80 | 21 |
| Six, 1930 | 12 |
| 8, 1930, 6, 1931 | 16 |
| Del. 8, 1930, 31, 32 | 19 |
| Imp. 8, 1930, 1931 | 26 |
| Six, 1932, '33, '34 | 16 |
| Roy. 8, 1933 | 19 |
| Imp. 8, 1933 | 20 |
| Imp. Cust. 8, 1933 | 27 |
| Roy. 8 CU, 1934 | 23 |
| CV, CX, 1934 | 23 |
| 6-C6, 1935 | 17 |
| 8-CZ, 1935 | 20 |
| 8-C1, C2, C3, 1935 | 19 |
| CW, 1935 | 24 |
| 6-C7, 1936 | 19 |
| 8-C8, 1936, C-14, 1937 | 22 |
| 8-C9, C10, C11, 1936, C-17, 1937 | 17 |
| Roy. C-16 | 20 |
| Cus. Imp. C-15 | 21 |
| **DE SOTO** | |
| St. 8, 1930 | 11 |
| St. 8, 1931 | 13 |
| Six, 1931, 1932 | 15 |
| Six, 1933 | 16 |
| Six, 1934 | 20 |
| Six, 1935 | 17 |
| Six, 1936 | 19 |
| S-3, 1937 | 20 |
| **DODGE** | |
| 1924 to 1928 | 11 |
| St., 1928 | 13 |
| Senior six, 1928, 1929 | 17 |
| Vict. 6, 1928 | 12 |
| Six, 1929, 1930 | 16 |
| 8, 1930 | 17½ |
| Six, 1931, 32, 33 | 14½ |
| Eight, 1931, 32, 33 | 16 |
| Six, 1934 | 18½ |
| Six, 1935 | 17 |
| 6-D2, 1936 | 14 |
| Six, 1937 | 16 |
| **ESSEX** | |
| Six | 19 |
| Super six, 1932 | 17 |
| **FORD** | |
| T, A, B | 12 |
| V-8, 1932, 33, 34, 36, 37 | 22 |
| V-8, 1935 | 20 |
| V8-60, 1937 | 15.2 |
| **GRAHAM** | |
| Std. 6, 1930 | 18 |
| Spec. 6, 1930, 1931 | 20 |
| Spe. Std. 8 | 26 |
| Cust. 8-34, 1931 | 26 |
| 8, 1931 to 1934 | 20 |
| 6-74, 1935 | 15 |
| 6-73, 1935 | 17½ |
| 8-72, 1935 | 18 |
| 8-75, 1935 | 20 |
| 6-80, 1936, 85, 1937 | 11 |
| 6-90, SC 110, 1936, 95, S.C. 116, S.C. 120, 1937 | 15 |
| **GRAHAM-PAIGE** | |
| 612, 1929 | 18 |
| 621, 1929 | 25 |
| 827, 837 | 27 |
| **HUDSON** | |
| 1928, 1929 | 22 |
| 8, 1930 to 1933 | 18 |
| Six, 1933 | 17 |
| 8, 1934, 1935, 1936 | 23 |
| 6, 1935 | 19 |
| 6, 1936, 1937 | 13 |
| 8, 1937 | 20 |
| **HUPMOBILE** | |
| S, 1929 | 13 |
| S, S-2, 1930-'31 | 14 |
| C, 1930, 1931 | 20 |
| H, U, 1930, 1931 | 28 |
| L, 1930, 1931 | 16 |
| 216, 1932 | 13 |
| 222, 1932; 332, 1934 | 21 |
| 226, 1932; 326, 1933 | 24 |
| 321, 1933 | 21 |
| 417, 1934, 421-J, 1934 | 16 |
| 427, 1934 | 24 |
| 518, 1935 | 20 |
| 321, 527, 1935 | 24 |
| 6-618G, 1936 | 18 |
| 8-621N, 1936 | 21½ |
| **LAFAYETTE** | |
| 1934, 1935, 1936 | 19 |
| 1937 | 20 |
| **LASALLE** | |
| 328, 1929 | 21 |
| 340, 1930; 345, 1931 | 24 |
| 1932, 1933 | 26 |
| St. 8, 1934, 1935 | 18 |
| 8-36-50, 1936 | 16½ |
| V8, 37-50, 1937 | 25 |
| **LINCOLN** | |
| 1928 to 1930 | 32 |
| 8, 12, 1931 to 1933 | 34 |
| 12-1934, 1935, 1936, 1937 | 32 |
| **LINCOLN ZEPHYR** | |
| H-901, 1936, 1937 | 27 |
| **MARMON** | |
| 68, 78, 1929 | 20 |
| Roosevelt, 8-69 | 16 |
| 8-79, Big 8, 1930 | 28 |
| 70, 1931 | 16 |
| 88, 1931; 8-128, 1932 | 28 |
| 16, 1931, 1932 | 29 |
| 16, 1933 | 34 |
| **MARQUETTE** | |
| 1929 | 12 |
| **NASH** | |
| Adv., 1927, 1928 | 22 |
| Adv. 6, 1929 | 19 |
| Std. 6, 1929 | 10 |
| Spe. 6, 1929 | 17 |
| Single 6, 6-60, 960 | 12 |
| 8-70, 1930 | 15 |
| 970, 1931 | 13 |
| 8-80, 1930 | 16 |
| 980, 1931 | 20 |
| Twin 8, 8-90, 990 | 22 |
| Big 6, 1932 | 17 |
| Spe. 8, 1932 | 21 |
| Adv. Amb., 1932, 1933 | 22 |
| 1120, 1933 | 19 |
| Std. 1933, Spe., 1933 | 16 |
| Big 6 1120, 1934 | 17½ |
| Adv. 8 1280, 1934 | 21 |
| Amb. 8 1290, 1934 | 22 |
| 6, 1935, 1936 | 17½ |
| 400, 1935, 1936 | 18 |
| Adv. Amb., 1935 | 21 |
| Amb. Super 8, 1936 | 21 |
| Amb. 6, 1937 | 17 |
| Amb. 8, 1937 | 18 |
| **OAKLAND** | |
| Six | 12 |
| 8, 1930, 1931 | 25 |
| **OLDSMOBILE** | |
| 1929, 1930, 1931 | 13 |
| 6 and 8, 1932 | 16¼ |
| 6, 1933 | 17 |
| 6, 1934 | 15 |
| 8, 1933, 1934 | 19 |
| F35, F36 | 13 |
| L35, L36, F37 | 16 |
| L37, 1937 | 25 |
| **PACKARD** | |
| 6-28, 6-26, 6-33 726, 733 | 20 |
| 8, 1925 to 1927 | 24 |
| 8, 1928; 6-40, 6-45; 7-40 | 25 |
| 901, 902, 1931 | 20 |
| 903, 904, 1931 | 25 |
| Lt. 8, 1932 | 19 |
| Std. 8, 1932 | 20 |
| Del. 8, 1932 | 25 |
| 12, 1932-37 | 40 |
| 8, 1933-36 | 20 |
| Super 8, 1934, 35, 36 | 22 |
| 120, 1935 | 16½ |
| 120-B, 1936 | 18 |
| 115-C, 1937 | 17 |
| 120-C, 1937 | 20 |
| 1500-01-02, 1937 | 24 |
| **PEERLESS** | |
| 125, 1929 | 20 |
| Std. 8, 1930 | 21 |
| Std. 8, 1931 | 14 |
| Master & Cust., 1931, 1932 | 23½ |
| **PIERCE-ARROW** | |
| 80, all | 22 |
| 81, 1928 | 21 |
| 8, 1929 to 1934 | 26 |
| 12, 1932, 1933, 1934 | 38 |
| 8-845, 1935 | 28 |
| 12-1245-55, 1935 | 40 |
| 8-1601, 1936; 1701, 1937 | 25 |
| 12-1602-03, 1936 | 38 |
| 12-1702-03, 1937 | 38 |
| **PLYMOUTH** | |
| Up to 1931 | 14 |
| 1932 | 15 |
| 1933 | 13 |
| 1934 | 14 |
| 1935, 1936, 1937 | 15 |
| **PONTIAC** | |
| Up to 1928 | 10 |
| 1929, 1931, 1932 | 14 |
| 1930 | 13 |
| 8, 1932 | 25 |
| 8, 1933, 1934 | 15 |
| 6, 1935 | 13½ |
| 8, 1935 | 14 |
| 6, 1936 | 15 |
| 8, 1936 | 16¾ |
| **REO** | |
| Fly. Cloud, 1928 | 16 |
| Wolv., B2, Fly. Cloud, 1929 | 14 |
| 15, 1930 | 14 |
| C Fly. Cloud, 20, 25, 1929, 30 | 19 |
| 6-21, 6-25, 1931 | 17 |
| 8-21, 8-25, 1931, 1932 | 16 |
| 8-31, 8-35, 1931 | 23 |
| S, 1932, 1933 | 20 |
| Royale, 1932, 33 | 23 |
| S4, 1934 | 19 |
| Fly. C. 1935, 1936 | 18 |
| Roy. 1935 | 20 |
| **STUDEBAKER** | |
| Big 6, 1926, 27 | 19 |
| Dict., 1928 | 14 |
| Com., 1928 | 20 |
| Pres., 8, 1928 | 20 |
| Dict., 6 & 8, 1929 | 15 |
| Com., 6, 1929 | 17 |
| Com., 8, 1929, 1930 | 14½ |
| Pres., 1929, 1930, 1931 | 21 |
| Six, 1930, 31, 32 | 12½ |
| Dict. 8, 1930, 31 | 18 |
| Com., 70, 1931 | 14 |
| Dict., 62 | 14 |
| Com. 71 | 16 |
| President 91 | 21 |
| Six 56, 1933 | 14 |
| Com., 1933 | 16 |
| Pres. 82, 1933 | 18 |
| Pres. 92, 1933 | 23 |
| Dict. 6, 1934 | 15½ |
| Com. 8, Pres. 8 | 18½ |
| Dict. 6, 1935 | 16½ |
| Com., 1935 | 21½ |
| Pres., 1935 | 21½ |
| Dict., 1936 | 14 |
| Pres., 1936 | 17 |
| Dict., 1937 | 13 |
| Pres., 1937 | 15½ |
| **TERRAPLANE** | |
| Six, 1934 | 18 |
| Six, 1935 | 16 |
| Six, 1936, 1937 | 13 |
| **VIKING** | |
| 1929, 1930 | 33 |
| **WHIPPET** | |
| 96A, 1930 | 11½ |
| 98A, 1930 | 15½ |
| **WILLYS** | |
| Six | 14 |
| Eight | 20 |
| 77, 1933-36 | 9 |
| 1937 | 11 |
| **WILLYS KNIGHT** | |
| 66, 1927 to 1930 | 21 |
| 70, 1926 to 1929 | 17 |
| 87, 1930 | 17 |
| 70A, 1928 | 16 |
| 66D, 1931, 1932 | 17½ |
| 95, 1931, 1932 | 15½ |





# Jenkins Sets New Records

Climaxing an assault marked by broad slides and injuries, D. A. "Ab" Jenkins, America's No. 1 speed record holder, quit mid-way toward a new 48-hr. record on September 22 at Bonneville Saltbed, in Utah, when the salty course "broke up" under the long list of records he established in every division of the record roster.

He had turned in a record average of 157.27 m.p.h. per hour for 24 hr., despite an injured arm, when he brought his "Marmon Meteor" to a stop with the announcement that the 12½-mile course laid out for him could no longer withstand his thundering pace. He was, therefore, forced to abandon for the present his run for the 48-hr. record which he has annually sought for the last three years at Bonneville. Last year's attempt was met by motor trouble and when he again got his car in shape, the season was too late to permit such a pretentious undertaking as a two-day continuous running record.

It was unlikely, as MOTOR AGE went to press, that Jenkins would get back onto the salt this season.

The courtesy which he has shown in past seasons was expected to keep him in the background while Captain George E. T. Eyston sets out with his giant "Speed of the Wind" to seek the records which Jenkins has established and to later try for the mile straightaway mark of 301.1292 m.p.h. held by Sir Malcolm Campbell.

Captain Eyston has a twin motored, six wheeled, Schneider Cup engined car read to "practice" for the straightaway record. The mount, "the craziest car you ever saw," according to Captain Eyston's own description, would make a serious attempt to better the Campbell record.

During Jenkins' concluding run he narrowly escaped serious injury or possible death when his powerful car went into a broad spin which carried him fully a half mile after it struck a soft spot on the wet course. Although he was said to be traveling 180 m.p.h. at the time, the car remained upright.

An hour later, misfortune again caught up with Jenkins when a tire blew out and bits of metal from the rear wheel cut his arm. After emergency treatment, he continued the run with his arm bandaged.

Along the trail of his newest speed assault, Jenkins left a long list of shattered records. The speeds are divided in the World's Unlimited, International Class "A" and American Unlimited and Class "A" brackets. They are the most pretentious yet seen on the international records roster. The new records begin at 10-mile distances and go on through 1 hr., 12 hr., 2000 and 3000 km. and 24 hr.

At 10 miles he averaged 181.11 m.p.h.; at 1 hr. he was clocked at 179.03 m.p.h.; at 12 hr. his gait was 160 m.p.h.; at 2000 km., 160.07; at 3000 km, 161.4 m.p.h. and at 24 hr. his record was 3.50 m.p.h. faster than his previous mark of 153.37 m.p.h.

As MOTOR AGE went to press, they were still checking the long Jenkins string preparatory to submission to the International Association at Paris, France, for world-wide recognition. However, the following shorter records, established September 8, have been confirmed to the International Association and are given on page 50.

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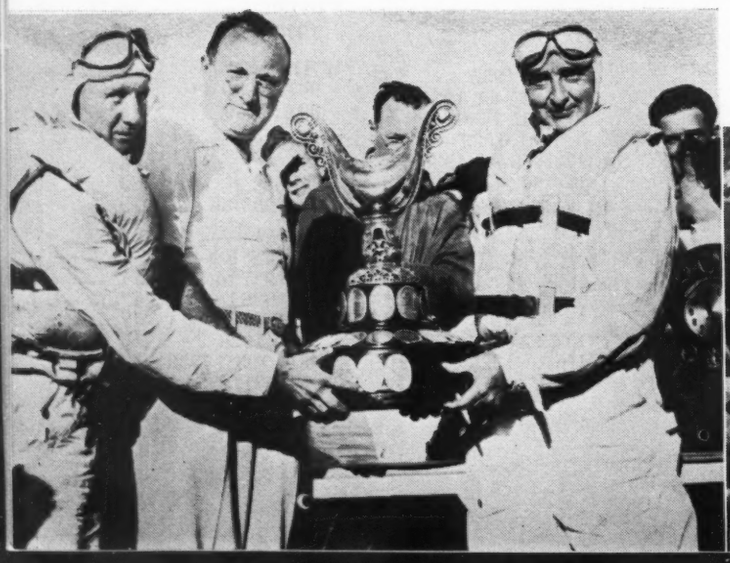
**Down the Column:**

**129.5 MPH** That is the new world's speedboat record established by Sir Malcolm Campbell, shown during a test run on Lake Maggiore, Switzerland

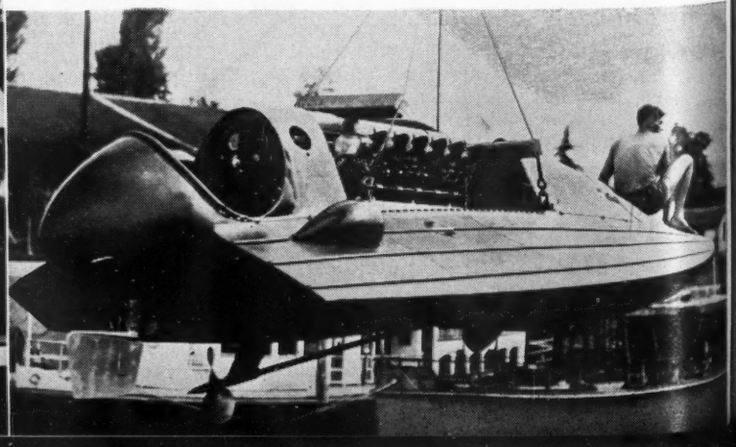
**Two In A Day** Frank Fuller won the $25,000 Bendix trophy for the fastest flight from Los Angeles to Cleveland, then without stopping continued to New York to set a new trans-continental record of 9 hr. and 35 min.

**German Invaders** Van Brauchitsch in a Mercedes led the field at the Monaco Grand Prix, and three of his countrymen took the next three places. Photo shows Hartman in a Maserati leading Rosemeyer's Auto Union

**Gold Cup Winner** Left to right are Ernest Herndon, mechanic; Herbert Mendelsohn, owner; and Clell Perry, pilot of the speedboat "Notre-Dame." They are shown with the trophy they won in the recent Detroit Gold Cup Races



**Record Breaker** "The Alagi," Count Theo Rossi's new speedboat, which holds the world's record in its class, with a speed of 91.5 MPH. It is equipped with a 6 cyl. 500-hp. Isotta motor



# Driver Examination Urged

Washington — Recommending "appropriate steps" be taken to obtain greater uniformity in both State and local motor laws, the Bureau of Public Roads has filed a special report with both Houses of Congress urging strict and uniform examinations of drivers and more stringent laws covering accident reporting in an effort to reduce traffic fatalities.

Citing the 37,800 deaths on streets and roads in 1936, the report reminded the country that accidents "have reached proportions that place them in the front rank of critical national problems." While attributing present conditions to the "individual driver and pedestrian" as factors most directly responsible, the Bureau pointed to wide variations in speed and other traffic regulations, inspection rules, and financial responsibility requirements between States as being important elements contributing to confusion rather than assistance.

The report suggested specifically that uniform minimum standards be developed for obtaining facts of accidents, searching study of inspection services, and the necessity of expanding highway police patrols for greater highway safety.

Congress had appropriated $75,000 for the study on highway safety and traffic conditions and had asked for recommendations for improvements. The report was due June 30, but the particular act providing for the study was late in passing and the investigation did not get under way as early as had been anticipated.

Another step being planned on Capitol Hill of interest to motordom was the consideration of a network of "super-highways" for commercial use on a toll basis. A special sub-committee of the House Interstate Commerce Committee will be asked to consider the subject further when Congress reconvenes, according to its Chairman, Representative Lea, Democrat of California. Although details of the plan were meager, Lea described the plan as providing for "broad, straight highways with a liberal number of lanes and no crossings" which ultimately would link all major industrial centers. The Congressman said the roads would be privately built.

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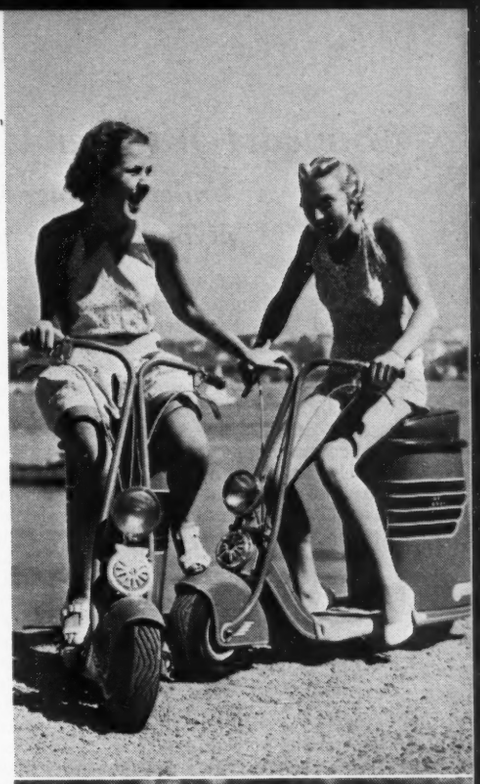
## *Wilbur Shaw Wins A.A.A. Racing Championship*

Wilbur Shaw—winner of this year's International Sweepstakes at Indianapolis—is automobile racing's new national champion despite failure to qualify for the season's final title classic September 12 at Syracuse, N. Y.

Points were not needed from the New York State Fair race won by Billy Winn, for Shaw had piled up sufficient credits at Indianapolis and at Roosevelt Raceway to stand 385 points above Ted Horn, runnerup in the final roster.

The American Automobile Association's list gives Shaw 1,135 points and Horn 750, including 75 points gathered at Syracuse. In third position is Bernd Rosemeyer, Germany's ace, who won the second annual George Vanderbilt Cup classic at Roosevelt Raceway in July. Ralph Hepburn, second

(*Continued on page 52*)



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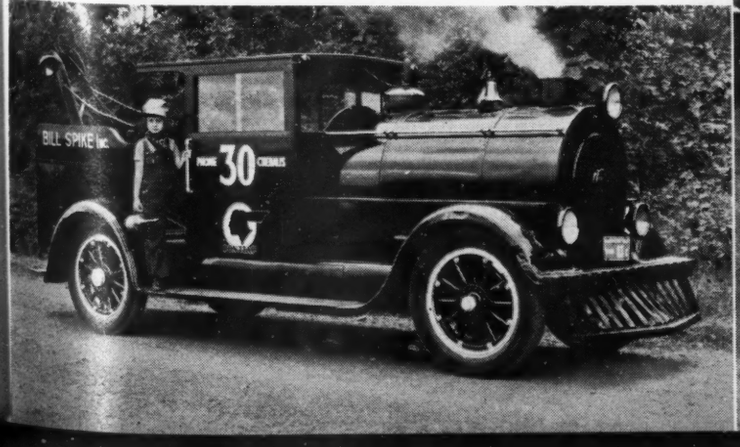
**Down the Column:**

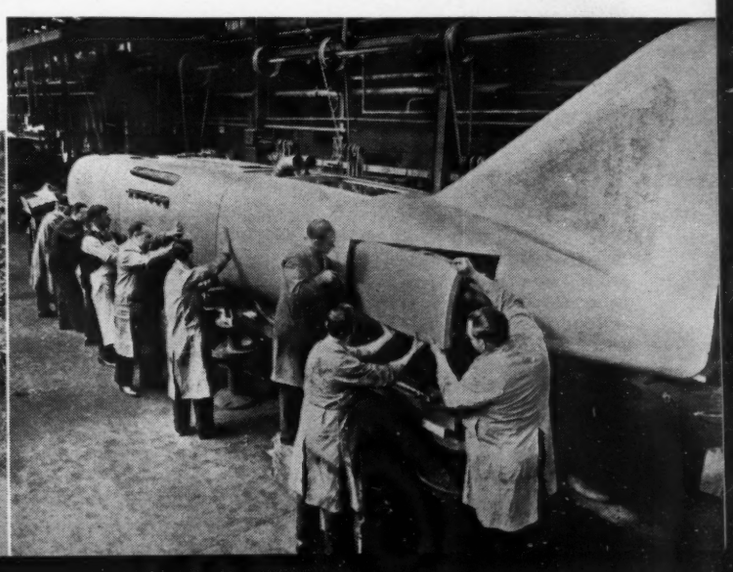
**Scoot Little Numbers** Two of the San Francisco 1939 Exposition beauties try out the motorized scooters, which will be one of the means of transportation for use of visitors to the fair. Guess we'll have to take in the fair

**Snail Race Pacer** That's about the best this bird can hope to attain with this bicycle, which is said to be one of the smallest ever built. Personally we would rather walk

**Monster** Captain George Eyston will drive this 36-ft. streamlined car on the salt flats of Utah in an endeavor to wrest the land speed record of 301 MPH from Sir Malcolm Campbell. Eyston hopes to attain a speed of 400 MPH. The car weighs about 7 tons and is powered by 12-cylinder, 6 x 6.6 in. Rolls-Royce engines, of 2225 cu. in. displacement each.

**Wrecker** Bill Spike, of Chehalis, Wash., built this "locomotive" tow car, which he says is a valuable traveling billboard. The engineer in this picture is Miss Sally-Jo Spike



# *Stewart-Warner Acts To Maintain Prices*

## *Under Tydings-Miller Act, Company is Now Supplying Jobbers with Resale Price Contract Forms*

The Tydings-Miller act, which was signed by President Roosevelt on Aug. 17, legalizes resale price maintenance contracts on trade-marked products between manufacturers selling in interstate commerce and their sales outlets in states having resale price maintenance laws.

Up to the passage of the national law 42 states had enacted their own resale price maintenance laws, more popularly known as Fair Trade laws. These laws, all of which follow the same pattern, permit a manufacturer or a wholesaler to enter into a contract with any sales outlet stipulating the price below which the product concerned cannot be resold. The contract then becomes binding on all other sales outlets in the state after they have been notified of its terms.

Although manufacturers in most industries have been hesitant about entering into such contracts they had become fairly prevalent in some trades particularly the drug, cosmetics, liquor, and book trades, which had become highly organized and had insisted that such contracts were necessary to the small dealer as a protection against the predatory price-cutting tactics of chains and some department stores. The chief objection expressed by most manufacturers was their fear of violating the federal anti-trust laws. The only way in which the federal laws could be avoided legally made it necessary for the manufacturer to set himself up in business in each of the fair trade law states, and that was expensive. Passage of the Tydings-Miller act removes both of those objections.

With a few exceptions, particularly in California where organized pressure compelled them to do so and in a few other instances where manufacturers were so well established as to have no immediate fear of competitors, the automotive industry has not participated in the resale price maintenance movement.

There are indications, however, that automotive products will become subject to resale price maintenance contracts either as the result of voluntary action by some manufacturers or as the result of dealer pressure on the part of some others. Because of this likelihood automotive retailers in the 42 states affected are familiarizing themselves with the law. The only states not having a Fair Trade law at the present time are: Alabama, Delaware, Mississippi, Missouri, Texas, Vermont, and the District of Columbia.

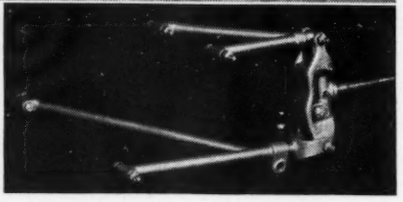
One of the first voluntary price maintenance actions taken by manufacturers in the automotive field is that recently announced to its jobbers by the Stewart-Warner Corp., in connection with its new "South Wind" car heaters. Stewart-Warner has advised the jobbers handling its line of heaters that contracts have been entered into which will not permit any jobber, no matter where located, to make sales in any of the Fair Trade states except at the standard prices and discounts stipulated in the contracts.

Furthermore it is supplying each jobber with contract forms to be signed by dealers in these states requiring such dealers to maintain the resale price on all "South Wind" heaters. "Failure of any retailer to adhere to the proper prices will result in prosecution of the retailer as surely as night follows day," the announcement declares.

As further evidences of its intent to enforce price maintenance the corporation has printed in large black type on every carton containing a heater the warning that failure to maintain the resale price will result in prosecution. A reproduction of this warning as printed on the heater carton is shown with this article.

**NOTICE**
**FAIR PRICE MAINTENANCE**

"For the protection of legitimate dealers, Stewart-Warner South Wind Heaters are sold under the FAIR TRADE ACTS of the several states where such laws exist. Agreements have been made which call for the maintenance of the advertised retail prices. ($19.95 for standard heaters complete with standard installation kits--Western $20.95). Price-cutting will be prosecuted in accordance with law. This notice shall not be deemed effective or binding in any state or under any circumstances where contrary to law."

**Ahead of Its Time** Back in 1924, Dick Spencer, Murray, Utah, who operates a service station, built this independent wheel suspension on a 1911 Whi e chassis. Although he has driven it many thousands of miles it is still in good operating condition.

## *Third Quarter Output to Top 1936 by 20%*

Current quarter's production by the automobile industry will run about 20 per cent higher than for the corresponding period of 1936. Almost to the unit, as many vehicles were built in the first two months of the current period as in the entire third quarter last year, so that September's output is a clear gain. The three months' total this year should run in the neighborhood of 1,042,000 units, compared with 866,960 units for the period a year ago. This assumes a September output of 175,000 units, which at this point is regarded as a fair appraisal for the month, although no close estimate can be made because of the irregularities of initial production after model changes. The industry is reasonably certain of going well beyond its September, 1936, production of 139,820 units.

## *American Hammered Used By Bendix Cup Winners*

The first five planes to cross the finish line in the recent Bendix Cup Cross Country Race, a feature of the National Air Races, used Pratt and Whitney engines equipped with American Hammered piston rings. These rings were also used by the second, third, fourth and sixth place winners in the Thompson Trophy Race. In this same race, Colonel Roscoe Turner, flying an American Hammered equipped plane, with over a lap lead, lost first place when he returned to round a pylon for the second time.

## *AMA Opens Drive on Headlight Glare*

### *Industry Working Through Dealers To Impress Public*

To minimize headlight glare in the eyes of 40,000,000 drivers and all pedestrians, the Automobile Manufacturers Association announced that its member companies are undertaking a comprehensive program to encourage proper use and maintenance of headlamps. This new program will supplement the extensive activities in the general field of highway safety which the industry is supporting through the Automotive Safety Foundation.

In announcing the program, Alvan Macauley, president of the association and of the Packard Motor Car Company, revealed that the automobile companies are mobilizing the support and collaboration of the industry's thousands of dealers and service stations. In addition, the industry plans to make use of every available channel through which motorists can be impressed with the importance of proper use of modern headlighting systems to give relief from glare and of regular maintenance.

## *Racing Cars Being Built*

While they lack verification, apparently reliable reports indicate that there will be a completely new and speedier line of American racing cars entered at the Indianapolis and Roosevelt raceways next year. Particulars as to changes in designs have not been disclosed but confidence has been expressed that the new cars will give the United States a higher rating than in past international contests.

One report has it that there will be five new American cars. Whether this number is correct or not it is understood that there will at least be several new ones. Among them, it is said, is one being built by the Bowes racing team under the management of Louis Meyer, famous driver.

Under the international formula as now drafted all cars are placed on an equal basis, so that, for instance, American drivers may go to Europe to enter in race competition. The specifications for next year also remove disadvantages that heretofore prevailed which made it necessary to have different cars for the Indianapolis and Roosevelt raceways. Now the same cars may participate in races on both speedways.

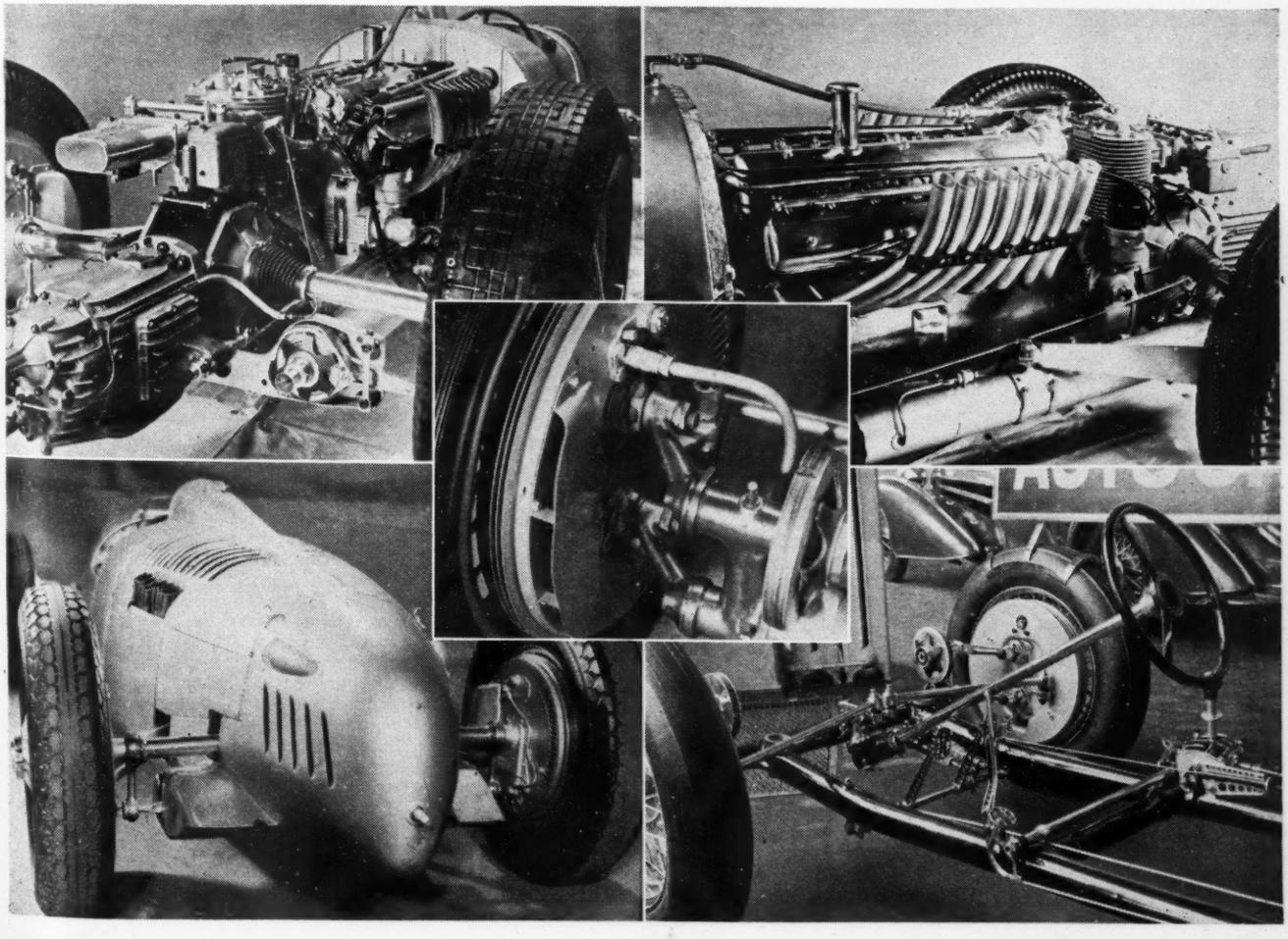
## *UAW'S Income Large*

### *Was $1,075,000 for 15 Months to June 30; Spent $647,000*

Income of the UAW during the 15 months since its last convention, to June 30 last, totaled $1,075,000, according to Secretary-Treasurer George Addes report prepared for submission to delegates at the Milwaukee convention opening next Monday. Of this amount, $912,600 was collected in the first half of 1937, the period of the union's most rapid growth. The union spent approximately $647,000 in 15 months for its intensive organization drive, leaving a balance of $428,000 in the treasury, of which $300,000 is invested in government bonds, according to the report. Salaries and expenses for the 228 officers, organizers, attorneys and office employes on the International's payroll during the 6 months of the current year totaled nearly $208,000. Homer Martin's salary for the 15 months was $3,943 and his expenses were $6,833. Each of the five general officers received slightly over $3,500 salary during the period, in addition to substantial amounts for expenses.

# Close-Ups of the Auto Union Racing Car

**In these pictures, which are the first available in this country, are shown the details of the Auto Union Racing Car. In the center is shown a front wheel with the air scoop for brake cooling, connections to the torsion bar front springing and shock absorber. Upper left is a view of the rear mounted engine, supercharger and transmission. Upper right shows the engine from the side looking towards the rear. At the lower left is the rear streamlining and details of the rear brake. Lower right shows the details of steering arrangement and chassis frame construction.**

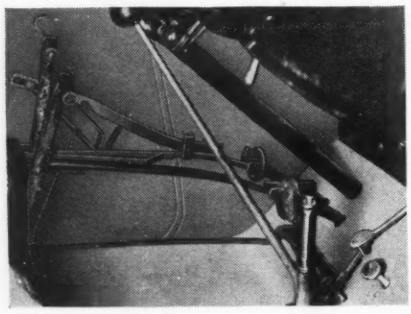



**THE entire sales organization of the Automobile Equipment Company, newly appointed USL distributor for the Detroit area, attending a sales conference at the USL factory, Niagara Falls, New York.**

### *Bantam Completes Production Plans*

Walter and Clarence Fishleigh, Detroit consulting automotive engineers, together with American Bantam Car Company designers, engineers and production men, have completed production plans for the new American Bantam line of trucks and autos.

Production is scheduled for early fall and will include quarter-ton chasses, panel and pick-up trucks, coupes and roadsters. Included in performance claims for the new car are the facts that it will go up to 60 miles on a gallon of gasoline, will attain a speed in excess of 60 miles an hour, and will cost less than three-quarters of a cent per mile for gasoline, oil and tires.



**Hand Control** Although Bob Wheeler is paralized from the waist down he drives his own car, using the system of hand levers shown here.

### *N.A.P.A. Warehousemen and Manufacturing Members to Meet*

Warehousemen and manufacturer members of the National Automotive Parts Association will meet in Chicago on Dec. 13 and 14 for their annual business session, according to an announcement just made by Henry Lansdale, NAPA General Manager.

The first day's program, says Mr. Lansdale, will be an executive meeting for warehouse owners and managers exclusively, while on the second day, a general session will be held for all warehousemen and manufacturers. Participants in the annual meeting represent the 38 national warehouses and 43 non-competing automotive lines of NAPA.

In his announcement, Mr. Lansdale calls attention to the fact that the meeting was purposely scheduled immediately following the Automotive Service Industries Show, which closes Dec. 11, so that NAPA members may conveniently attend both.

The two-day NAPA conference will be held in the Hotel Knickerbocker. Further details and plans will be announced later by Mr. Lansdale.

### *I G & M A Announces Conference Dates*

The International Garage & Maintenance Ass'n, who sponsors the annual national Conference of independent automotive service and garage operators, have announced Sunday, Monday and Tuesday, Oct. 17, 18 and 19 as the dates, and Chicago as the place—Hotel Morrison as Conference Headquarters.

For the benefit of visiting operators, one day—Tuesday, Oct. 19—will be devoted entirely to the subject of Safety Inspections, with a visit to Chicago Safety Lanes operated under a compulsory inspection ordinance and system which has attracted nation-wide attention because of its success after two years of operation.

Labor relations, a plan for revitalizing local associations, how independents are to meet chain-store competition, three clinics and a special session for parking garages are among the program features. Independent parts manufacturers and jobbers will have an opportunity to present their sides of the present service trends.

The Round-Table Luncheon, which always brings together a large representation of service operators, jobbers and manufacturers, will be held on Tuesday noon.

With the attendance of I G & M A State and City Council Chairmen, local organization officers from 20 cities, and operator leaders from all sections of the country who are interested in the progress and future of their business, this 1937 National Conference will be of vital importance and value to the independent service trade.

This National Conference is sponsored by I G & M A and all independent service leaders, manufacturers and jobbers are urgently invited to attend.

### *Reflector Reflections*

A revolutionary parking ordinance just adopted in New York City which establishes that it is no longer illegal to park a car in the street at night without lights, so long as the car is equipped with reflectors, may change parking regulations in many states throughout the country, according to Alpheus S. Holmes, New York regional manager of the AC Spark Plug division of General Motors.

Holmes said that several dozen motorists in New York City Court on charges of parking at night without lights pocketed the bills with which they had been prepared to pay their fines, when the parking ordinance was changed the other day after high city officials decided that reflectors as required by the new law in New York State gave ample warning at night of the presence of a parked car.

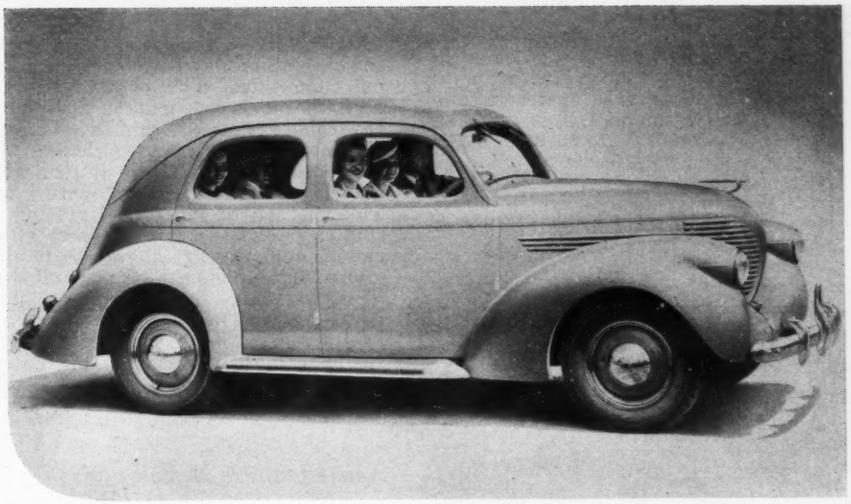
New Jersey, Holmes said, is the latest of the several states to adopt safety laws requiring an approved red reflector on the rear of all motor vehicles. The New Jersey law became effective this month, he said.

**Walter Macphail**

**W. J. Corbett,** vice-president and manager of the Horn Division of Sparks-Withington Company, has announced the establishment of a New Horn Sales Department under the direction of Walter Macphail, for the marketing of Sparton Horns to automotive jobbers.

### *Life Savers for Service Stations*

Gasoline service stations as an outlet for gum and candy sales is a plan of merchandising being undertaken by the Life Savers and Beech-Nut Sales Company, Limited, Hamilton, Ont. Dispensers in the form of cabinets, with mica doors, provide for a clear view of a wide assortment of the company's products. These are hung in a prominent place where motorists may see them when buying gasoline. The cabinets filled with gum and candy having a retail value of $15 are sold to oil stations for $10. Automobile markers are also being distributed by the Life Savers organization. These have a round white Life Saver, with a red glass center, and the wording "Be A Life Saver—Drive Carefully."



# WILLYS

HAVING sold over 63,000 cars during the 1937 selling season, representing an increase of approximately 300 per cent over last year, Willys has elected to continue the same chassis with only detailed changes. Planned production for the 1938 sales period calls for over 120,000 units.

The 4 cylinder, 3⅛ x 4⅜ in. engine is mounted in a 100 in. wheelbase chassis. Power to the semi-floating rear axle is supplied through a single plate clutch and three-speed synchronized shift transmission. In the interests of long life, and reduced oil consumption, the pistons are of cast iron and are fitted with three compression rings and one oil ring. At 3200 r.p.m. the engine develops 48 hp. with a 5.7 to 1 compression ratio. Owners claim up to 35 miles per gallon of fuel.

Six models are being shown in the passenger car division, a Standard Sedan, a DeLuxe Sedan and a Custom Sedan, and three coupe models, an Economy, a Standard and a DeLuxe. Announcement also was made of a new pick-up commercial unit of 1000-pound capacity in which the mechanical specifications closely follow those of the passenger car production.

All models closely follow the original Willys lines which attracted favorable attention throughout the country when they were first disclosed in October of last year.

The overall length for the car is 178 inches, giving it a comparative body length with the next lowest price competitor in the field.

Improvements in the Willys-built power plant include a newly designed radiator.

In the chassis, improvements include a faster steering gear ratio, which adds materially to driving ease,

(*Continued on page 70*)

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**Fred. C. Williams**

**Appointment** of Fred C. Williams, for the last three and a half years a member of the Detroit staff of Campbell - Ewald Company, advertising agency, as assistant advertising manager of the Nash Motors Division of Nash-Kelvinator Corporation, has been announced by A. R. Boscow, Nash's director of advertising and merchandising.

Mr. Williams, whose appointment is a part of Nash's program of expansion, will assist Mr. Boscow in coordinating and making more effective the company's local distributor and dealer advertising and merchandising activities, which will be developed this coming year to the highest degree in the company's history.

## *Widely-Known Racing Editor and Writer Passes*

William F. Sturm, automobile racing editor of the Indianapolis *News* and holder of many early cross-country records, died Aug. 25 at 53.

In addition to his background of driving, Mr. Sturm was manager for many racing drivers including the late Maj. O. D. Seagrave, Sir Malcolm Campbell and Kaye Don, all Britons. Among his American charges were the late Frank Lockhart and "Cannonball" Baker. With Baker, Mr. Sturm was co-holder of the first round trip across the continent.

Twenty years ago, Mr. Sturm held the coast-to-coast record of 5 days, 17 hr., 33 min.

Mr. Sturm himself covered every Indianapolis Speedway race since the track was opened in 1909.

## *Pierce-Arrow Plans Approved*

Stockholders of Pierce-Arrow Motor Corp., Buffalo, N. Y., approved a plan of recapitalization and reorganization at a meeting Sept. 2.

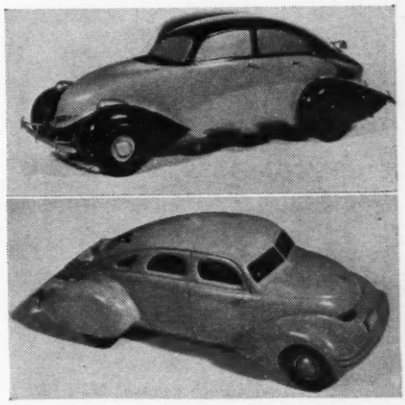
Purpose of the new financing is to raise funds for the production of a new car to sell around $1,200. President A. J. Chanter said at the meeting that the production schedule initially calls for the manufacture of about 1200 of the present high-priced cars, 25,000 of the new medium-priced line and 4800 trailers.

## *Unusual Mixture*

Half a dozen curtain rods, three old airplane wheels, one well-used range stove cleaner, the gasoline tank from a 30-year-old stationary engine and one ancient engine were the materials used in the hand manufacture of a farm tractor by a Regina, Sask., farmer. He used a hack saw, hand drill and file. The tractor works so well that the farmer is selling his team of horses.

**N. E. Heil** was re-elected president of the Tripleware Brake Linings Corporation at a recent meeting of the Board of Directors. New officers are: J. O. Camp, vice-president, and Harold Westerhoff, assistant secretary and treasurer.

**W. E. England** has resigned as chief engineer of Willys-Overland Motors, Inc.

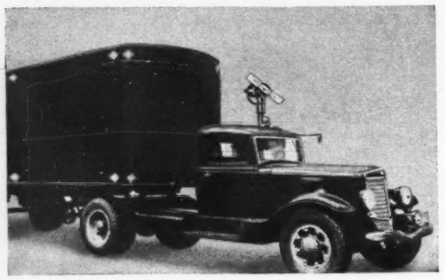


**The Kids Again** Here are two prize winners in the Fisher Body Craftsmen's Guild model car competition. Above is a front-engine type made by a 14 year old Detroiter competing in the junior division. Below is a rear-engine type made by a lad from London, Ohio, competing in the senior division. This car is designed to have an air conditioning unit forward. Each boy won a $5,000 scholarship.

### *Hi-Way Wincharger*

The Wincharger Corporation of Sioux City, Iowa, manufacturers of Hi-Way Winchargers for trucks and trailers, will be among those exhibiting at the National Automotive Accessories Association Show in Chicago August 9 to 13.

Hi-Way Winchargers, which derive power from the wind to provide extra charge for batteries, come in two



models; Utility and Streamline. They are for use on trucks to provide extra power necessary for safety lighting and radio operation. On trailers they are used to provide power necessary for lighting and the operation of radio and small electric appliances.

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### *Chromium Plated Cylinder Bores*

The firm of R. A. Lister & Co. of Dursley, England, has developed a method of plating cylinder bores with chromium, based on a Dutch invention. Cylinder bores so plated were exhibited at the recent London automobile show. The surface obtained is very smooth and extremely hard. By way of a comparative test a chromium-plated cylinder and a cast iron cylinder which had its bore nitrided were mounted on the same crankcase. The engine was then run night and day at 1000 r.p.m., the temperature of the surrounding air being changed at intervals. After 1500 hrs. the wear of the chromium-plated cylinder bore was only one-third that of the nitrided bore, so it is reported. Still more favorable results are said to have been obtained at 650 r.p.m. although the lubrication oil was then diluted with additions of 50 per cent of fuel oil. This method of chromium plating is said to be equally applicable to automobile and aircraft engines. It also gives valuable results when applied to tools and various mechanical parts. However, it is necessary that the cast iron employed be of a special quality. Lister is offering licenses to British Diesel engine manufacturers.—*La Technique Moderne.*

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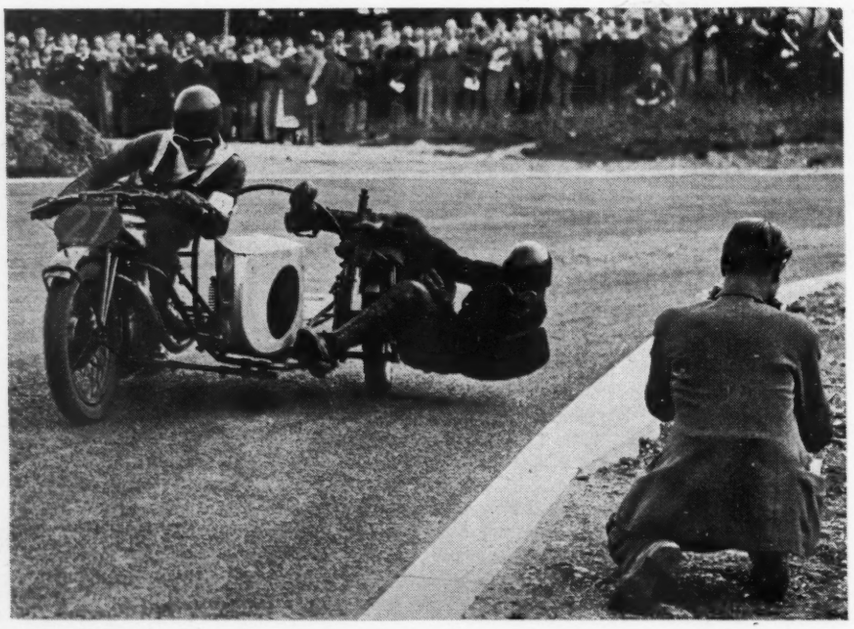
### *New Cleaners Developed By Magnus*

The Magnus Chemical Co., Garwood, N. J., makers of cleaning materials and metal working lubricants, has recently announced two new products.

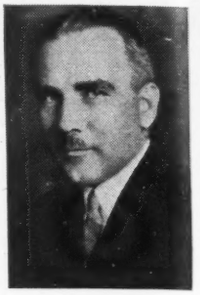
Magnus Steam Cleaner, for steam and vapor cleaning, is made in two grades—No. 92-E for light duty cleaning, and No. 94-E for heavy duty cleaning. The product is a light brown paste, having the appearance and texture of soft soap. It is said to dissolve readily in warm water and form a very fine emulsion, almost transparent. It is used for cleaning oily dirt and grease from parts, and can be used effectively for difficult floor cleaning jobs. Packed in 150-lb. and 400-lb. drums.

Sludge is another new Magnus product, developed for cleaning internal combustion motors. It is a penetrating solvent, used in a manner similar to flushing oil, cleaning out sludge and carbonized oil from the crankcase, cylinder walls and piston ring grooves. It is claimed to be non-corrosive to metals and will not injure gaskets or packings. Packed in 5, 15 and 50 gallon drums.



**Some Hangover** A motor-cycle and sidecar narrowly miss a photographer at a hairpin bend during the London Grand Prix cycle race.

### *Rogers Appointed S. M. General Armature*



C. J. Rogers

General Armature Corporation, Chicago and Lock Haven, Pa., manufacturers of automotive replacement armatures and generators, announces through its president, Lou Mervis, the appointment of Carroll J. Rogers as general sales manager. Mr. Rogers was formerly sales executive for General Motors and Willys-Overland, having been in charge of field operations and car distribution for the latter many years.

As a result of this move, Mr. Mervis, who in the past has directed sales activities of General Armature Corporation, will be enabled to devote himself exclusively to factory administrative and production problems. "This move," said Mr. Mervis, "has become necessary due to the steady growth of our company and constantly increasing volume of business."

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### *Tire Valve Replacement Outfit*

Tire valve stems injured by rim cutting or flat tires can now be replaced easily in just a few minutes. A special tire valve replacement service station outfit, made available by The Dill Mfg. Co., 700 East 82nd St.,


Cleveland, Ohio, provides complete facilities for electric vulcanization. The outfit includes one Dillectric pressure clamp with transformer for 110, 125 or 220 volt AC light connection and an assortment of valve stem replacement units. The complete outfit is priced at $5.95 and is available at most automotive jobbers and tire company branches.

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### *McKay Makes Electrodes*

The McKay Company, 1005 Liberty Ave., Pittsburgh, Pa., makers of tire chains and industrial chains, has announced the establishment of a new division for the making of shielded-arc welding electrodes. A new plant has been built at York, Pa., equipped and put into production. The most advanced machinery and methods for the manufacture of welding rod are used. A wide range of types and sizes of rod will be produced under conditions that assure highest quality through uniform control and high precision of product.

# IT'S JUST AN OLD PONTIAC CUSTOM TO BREAK RECORDS EVERY YEAR

With the presentation of the 1938 Pontiacs just around the corner, and with Pontiac dealers clearing decks for action in the expectation of surpassing this year's great record, it is high time to bring you up to date on Pontiac's amazing success story. Here's the record since Pontiac introduced the first Silver Streak at the end of 1934 and put Pontiac dealers a step ahead of the rest of the low-priced field. Sales have climbed 233% in that short period. Pontiac has become the second biggest volume unit in General Motors. In many points only the lowest-priced cars now show larger sales! And dealer profits have increased over three times more than sales! That's progress in anybody's language—such progress that astute business men the country over rate the Pontiac franchise as the best bet in the industry.

* * *

*If you are interested in acquiring the Pontiac franchise, please communicate with C. P. Simpson, General Sales Manager, Pontiac Motor Division, General Motors Sales Corporation, Pontiac, Mich. Your communication will be regarded as strictly confidential.*

CAUSE

EFFECT

AMERICA'S FINEST LOW-PRICED CAR

## A THREE YEAR INCREASE IN DEALER PROFITS

**1935**—INCREASE OVER 1934—**384%**

**1936**—INCREASE OVER 1935— **23%**

**1937**—INCREASE OVER 1936— **58%**

(FIRST SEVEN MONTHS)

# Prosper with PONTIAC

*Second Biggest Seller in the General Motors Line*

**World's Unlimited and International Class "A"**
*(Standing Start)*

| Distance | Time | M.P.H. | Former Record Held By |
|---|---|---|---|
| 50 Km. | 11:12.24 | 166.38 | 164.82—Cobb |
| 50 Mi. | 17:37.13 | 170.27 | 166.77—Cobb |
| 100 Km. | 21:40.82 | 171.96 | 167.62—Cobb |
| 100 Mi. | 34:15.83 | 175.11 | 169.57—Jenkins |
| 200 Km. | 42:22.99 | 175.93 | 170.29—Jenkins |
| 200 Mi. | 1:07:38.00 | 177.43 | 171.30—Jenkins |
| 500 Km. | 1:50:13.88 | 169.11 | 167.11—Jenkins |
| | 1 Hour | 177.05 | 171.00—Jenkins |

**International Class "A"**
*(Flying Start)*

| | | | |
|---|---|---|---|
| 10 Mi. | 03:18.77 | 181.11 | 175.45—Eyston |

**American Unlimited and American Class "A"**
*(Flying Start)*

| | | | |
|---|---|---|---|
| 10 Mi. | 03:18.77 | 181.11 | 175.45—Eyston |
| 50 Km. | 10:37.95 | 175.32 | 173.96—Eyston |
| 50 Mi. | 16:59.09 | 176.63 | 171.93—Jenkins |
| 100 Km. | 21:01.37 | 177.34 | 172.10—Jenkins |
| 100 Mi. | 33:35.26 | 178.64 | 172.52—Jenkins |
| 200 Km. | 41:43.21 | 178.72 | 172.68—Jenkins |
| 200 Mi. | 1:06:58.34 | 179.18 | 172.71—Jenkins |
| 500 Km. | 1:49:48.26 | 169.77 | 167.94—Jenkins |
| | 1 hour | 179.03 | 172.71—Jenkins |

Ab Jenkins

## Jenkins Records

Above is a table of the records set by Ab Jenkins in his recent speed trials at Bonneville, Utah. The story behind these records will be found on Page 42.

### *A.C. Announces Sales Expansion Program*

An expansion program of the sales staff of the AC Spark Plug division of General Motors has been announced by Wilson S. Isherwood, general sales manager.

The expansion includes a new regional sales office in Philadelphia, which will be in charge of Mr. John C. Hines. This region includes areas located in the states of Pennsylvania, New York, New Jersey, Maryland, Virginia, West Virginia, Ohio, North Carolina, Delaware and the District of Columbia.

Mr. Hines has appointed Forrest F. Van Allen, formerly AC sales representative, to be office manager, and William F. Parker and George B. Thompson to be zone managers.

The Flint region headquarters have been transferred to Cleveland and Edward H. Merrell, formerly zone manager, has been promoted to the position of regional sales manager there.

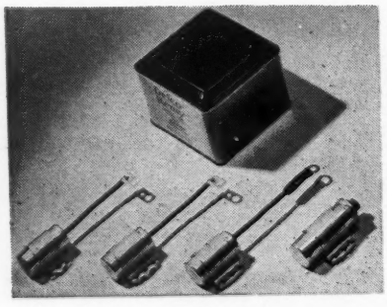
The Cleveland region will include Indiana, Kentucky, Ohio and parts of Pennsylvania, Illinois and West Virginia.

David I. Barton and Donald W. MacLean, formerly sales representatives, have been promoted to zone managerships in the Cleveland region, and Edward R. Mayville, for many years office manager, will continue as office manager in Cleveland.

Another major appointment in connection with the expansion activity is that of Eugene B. Powell of Los Angeles, who will come to Flint as a member of the general sales headquarters staff. Frederick E. Cox and Ernest E. Chapin, formerly sales representatives in the Pacific Coast region, have been promoted to zone managerships in that region.

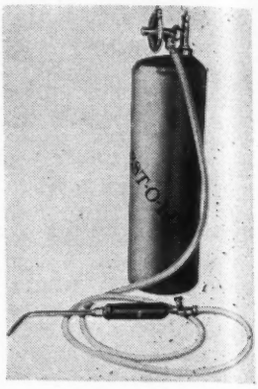
### *Universal Delco-Remy Condensers for Replacement*

Four new service condensers have been announced by the Delco-Remy Division of General Motors Corp., Anderson, Ind., for servicing Delco-Remy equipped passenger cars. These



four condensers replace more than 30 condensers, requiring a smaller inventory and providing quicker turnover for the service station. Sold through United Motors Service.

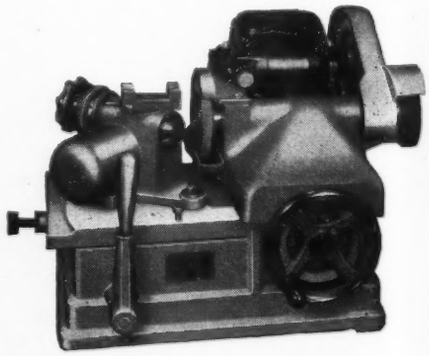
### *Air-Acetylene Torch For Body Soldering*



The Linde Air Products Co., 30 East 43rd St., New York City, has announced the development of the air - acetylene torch for use in body and fender repairing, as being a handier tool to use than the oxy-acetylene outfit. The heat from the air-acetylene torch is spread out and less intense, and works with less danger of overheating the metal or any woodwork that might be inside the body. For general outomobile repair and maintenance work the Prest-O-Lite 5-in-1 outfit is considered best adaptable. It includes a torch handle, four torch stem mixture assemblies, one soldering iron assembly, 6 ft. of ¼ in. hose, wrench and necessary hose clamps. The outfit is packed in a durable metal case with snap lock and fitted with spring clips to hold the parts in place. Acetylene tanks are supplied in two sizes, 40 and 10 cu. ft. capacity. Use of the Prest-O-Lite 10-lb. regulator insures a constant and correct gas flow to the blowpipe.

### *Hall Has New Valve Refacer*

A new precision valve refacer has been introduced by the Hall Mfg. Co., P. O. Box 217, Station C, Toledo, Ohio. This refacer, known as their Model 70, is of the dry type, and is powered by two 110 volt motors. The work head has a ball bearing spindle and is driven by worm and gear at a speed of 120 r.p.m. The chuck has an expanding collet with a range of 9/32 in. to 9/16 in., and a larger collet can be supplied with a range of ½ in.



to 11/16 in. The work head is doweled and is adjustable to all angles to 90 deg. Diamond dresser can be used without removing valve from the chuck. A micrometer feed indicates the amount of metal being removed. Depth gage, rocker arm, Ford valve stem and other attachments are available. For complete information and prices, write the manufacturer.

# The Exide way is the easy way to increase battery profits

Unless you frequently sell batteries on which you make a $5 profit per sale, you are missing an important bet . . . and it's time to get in touch with Exide. When you do you'll find that—Easy Does It.

**Here's the battery**


**Here's the way to sell them automatically**


*Exide Automatic Vendor*

**...and here's the way to start**

## FILL IN THE COUPON NOW

The Electric Storage Battery Co.
1807 W. Allegheny Avenue, Philadelphia, Pa.

What are the facts on "Easy Does It" and $5 profit per battery? I'd like to hear the whole story. Please send it along.

**Name**_____

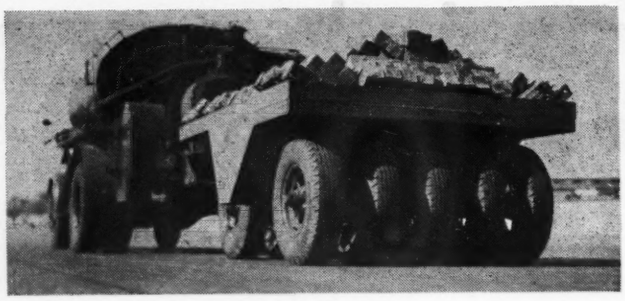
**Name of Station**_____

**Address**_____

THE ELECTRIC STORAGE BATTERY CO., Phila.
*The World's Largest Manufacturers of Storage Batteries for Every Purpose*
Exide Batteries of Canada, Limited, Toronto

## WHEN IT'S AN EXIDE

## YOU *START*



**Track roller of unusual design used on the Indianapolis Speedway. It has fifteen tires and is loaded with several tons of sand, concrete and bricks. The purpose is to condition the asphalt-covered turns.**

### *Oilometer Combined In Gear Shift Ball*

The Robinson Co., First National Arcade, St. Paul, Minn., has introduced a combination gear shift ball and meter that can be set to indicate periods at which lubrication is desired. The meter is fitted into the gear shift ball, and indicates the mileage at which the car should be re-


turned to the dealer for oil changing or lubricating. It eliminates the necessity of attaching tags to the car, and serves as a guide to remind the owner of lubrication periods. List price, $1.25.

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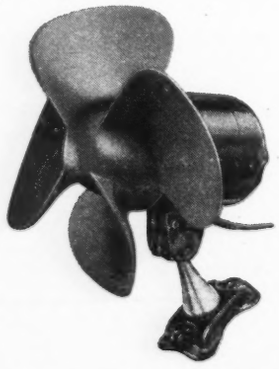
### *Defroster Fan Has Rubber Blades*

A new defroster fan introduced by the Fulton Co., 1912 South 82nd Ave., Milwaukee, Wis., uses extra large, deep-pitched rubber blades, eliminating the necessity of a guard. The blades are rigid enough to hold their shape at high speed operation, yet are soft enough to prevent in-



jury to careless hands or fingers. A large capacity motor permits fan to operate at high speed with a minimum drain on the battery. It can be installed on the steering post, cowl or header board.

## Shaw AAA Champ

(*Continued from page* 43)

place winner at Indianapolis is fourth and Lou Meyer, three-time national champion is fifth by reason of his fourth place at Indianapolis.

Until Billy Winn flashed to a record victory in the most sensational 100-miler ever seen in the long history of the New York fair, he did not appear on the championship roster. His 200 points at Syracuse put him in sixteenth place. Six other finishers added to the point standing crowded earlier credit holders to lower places.

The Syracuse results did not alter positions in the first fifteen posts of the roster.

Winn's new 100-mile speed record resulted from a reckless duel with Rex Mays, sensational Californian who grabbed third place at Roosevelt Raceway in July. Mays, on the pole because of his blistering 89 miles per hour for the qualifying mile, was caught by Winn on the forty-eighth lap. A two-way battle continued until the sixty-eighth when Mays was forced to abandon the pursuit because of a cracked motor block.

Having lapped the field in his duel with Mays, Winn wrote his own ticket in the remaining miles, but kept his gait at a peak sufficient to show a new all-time average of 87.5 miles per hour in the 1 hour, 8 minutes and 34.71 seconds he consumed in reaching the finish line. The speed climaxed his own record of 83.5 miles per hour at which other winners have annually shot since he hung up the mark in 1935.

Of fourteen starters, nine finished the grind. Following Winn were: second, Jimmy Snyder; third, Bob Sall; fourth, Duke Nalon; fifth, Mauri Rose, winner last year and the current champion until Shaw is crowned early in 1938; sixth, Ted Horn; seventh, Ken Fowler; eighth, Chet Gardner; ninth, "Shorty" Cantlon, winner in 1934.

Winn got $2,200 of the $7,700-purse.

Shaw will be officially crowned king of the speed realm next May on the eve of the twenty-sixth annual International Sweepstakes at Indianapolis. He will receive a diamond-studded gold medal, gift of the American Automobile Association's Contest Board. Horn and Rosemeyer will receive medals for second and third places.

Following is the official National Championship standing for the 1937 season, showing the points gained and the positions in the three title classics:

| Pos. | Driver | Ind. May 31 | R. R. July 5 | Sy'cuse Sept. 12 | Total |
|---|---|---|---|---|---|
| 1. | Wilbur Shaw | 1,000 (1) | 135 (9) | ... | 1,135 |
| 2. | Ted Horn | 675 (3) | ... (9) | 75 (6) | 750 |
| 3. | Bernd Rosemeyer | ..... | 600 (1) | ... | 600 |
| 4. | Ralph Hepburn | 598.125 (2) | ... | ... | 598.125 |
| 5. | Lou Meyer | 550 (4) | ... | ... | 550 |
| 6. | Richard Seaman | ..... | 495 (2) | ... | 495 |
| 7. | Bill Cummings | 249.375 (6) | 195 (7) | ... | 444.375 |
| 8. | Rex Mays | ..... | 405 (3) | ... | 405 |
| 9. | Cliff Bergere | 335.25 (5) | ... | ... | 335.25 |
| 10. | E. Von Delius* | ..... | 330 (4) | ... | 330 |
| 11. | Billy DeVore | 273 (7) | ... | ... | 273 |
| 12. | G. Farina | ..... | 256.5 (5) | ... | 256.5 |
| 13. | George Connor | 225 (9) | ... | ... | 225 |
| 14. | Joe Thorne | ..... | 225 (6) | ... | 225 |
| 15. | Tony Gulotta | 206.25 (8) | ... | ... | 206.25 |

**Beats Huskies**
**This snow shay, built by E. M. Tucker of Sacramento, Cal., is powered by a 30 HP motorcycle engine. It gets traction from a 5 foot spiral, has a top speed of 35 MPH and will pull a load of 2000 pounds on a sled.**

# *Guaranteed to move fast!*

*Sold by Bendix with unique one-year guarantee against obsolescence! Any slow moving parts returnable for exchange*


## NEW UNIVERSAL STROMBERG PARTS ASSORTMENT

THERE isn't a carburetor set-up in the world to match this! You *can't* fail to make money on it.

Bendix will ship you, on order, this big steel cabinet, stocked with Stromberg Carburetor parts assorted to service all Stromberg-equipped cars and trucks from 1931 to date. List price, parts included, is $310, subject to liberal trade discount.

This gives you full command of a matchless market, because for years more makes of cars have been equipped with Stromberg Carburetors than with all others combined!

And Bendix promises you this merchandise will sell. It's backed by a 12-months obsolescence guarantee!

Write TODAY for the details—tell us the type of your business.

**INDEXED IN THIS HANDSOME STEEL CABINET!**

Steel partitioned drawers hold every part needed to service all standard-equipment Stromberg Carburetors since 1931. Gasket cabinets cover same range of cars and trucks. Everything plainly marked with "Built-in" Index System, Quantity, Price, Location and Part Numbers shown on each compartment.

## BENDIX PRODUCTS CORPORATION

401 Bendix Drive (Subsidiary of Bendix Aviation Corporation) South Bend, Indiana

# Mechanical Specifications

These Specifications Are Brought Up-to-Date Each Month by the

| Line Number | MAKE AND MODEL | Lowest Priced 4-d. Sed. (Dlvd.) | Wheelbase (Ins.) | Tire Size (Ins.) | ENGINE | | | | | | | | | | | | | | | CHASSIS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | No. of Cylinders, Bore and Stroke | Taxable HP. | Piston Displacement (Cu. Ins.) | Maximum Brake HP. at Specified R.P.M. | Compression Ratio (to—1.) | Displacement Factor § | Cylinder Head Material | Camshaft Drive Make | Piston Material | Oil Cleaner Make | Air Cleaner Make | Carburetor Make | Muffler Make | Electrical System Make | Battery Make | Clutch Type and Make | Gearset Make | Universals Type and Make | Rear Axle Type and Make | Rear Axle Ratio | Front Spring Suspension |
| 1 | Buick.....37-40 | 950 | 122 | 6.50/16 | 8-3 3/8x4 1/8 | 30.6 | 248.0 | 100-3200 | 5.70 | 39.2 | Cl.. | LB... | Ala.. | No... | AC.. | SM.. | Wal.. | D... | Del.. | P.Own.. | Own. | m-Spi... | ½ Own | 4.40 | IC.. |
| 2 | Buick.....37-60 | 1162 | 126 | 7.00/15 | 8-3 1/8x4 1/4 | 37.8 | 320.2 | 130-3400 | 5.90 | 42.7 | Cl.. | LB... | Ala.. | No... | AC.. | SM.. | Wal.. | D... | Del.. | P.Own.. | Own. | m-Spi... | ½ Own | 3.90 | IC.. |
| 3 | Buick.....37-80 | 1418 | 131 | 7.00/16 | 8-3 1/8x4 1/4 | 37.8 | 320.2 | 130-3400 | 5.90 | 39.4 | Cl.. | LB... | Ala.. | No... | AC.. | SM.. | Wal.. | D... | Del.. | P.Own.. | Own. | m-Spi... | ½ Own | 4.22 | IC.. |
| 4 | Buick.....37-90 | 1966 | 138 | 7.50/16 | 8-3 1/8x4 1/4 | 37.8 | 320.2 | 130-3400 | 5.90 | 40.2 | Cl.. | LB... | Ala.. | No... | AC.. | SM.. | Wal.. | D... | Del.. | P.Own.. | Own. | m-Spi... | ½ Own | 4.62 | IC.. |
| 5 | Cadillac..V8-60 & 65 | (f) | 124-131 | (t) | 8-3 1/16x4 1/2 | 39.2 | 346.0 | 135-3400 | 6.25 | 40.9 | Cl.. | Mor.. | Ala.. | Han.. | AC.. | Str... | Old.. | D... | Del.. | P.Long.. | Own. | Nb-Mec. | ½ Own | (u) | IC.. |
| 6 | Cadillac..V8-70 & 75 | (h) | 131-38 | 7.50/16 | 8-3 1/16x4 1/2 | 39.2 | 346.0 | 135-3400 | 6.25 | 41.4 | Cl.. | Mor.. | Ala.. | Han.. | AC.. | Str... | Old.. | D... | Del.. | P.Long.. | Own. | Nb-Mec. | ½ Own | (v) | IC.. |
| 7 | Cadillac.....V12-85 | 3535 | 138 | 7.50/16 | 12-3 1/8x4 | 46.9 | 368.0 | 150-3600 | 6.00 | 40.8 | Cl.. | Mor.. | Ala.. | Han.. | AC.. | DL.. | Own. | D... | Del.. | P.Long.. | Own. | Nb-Mec. | ½ Own | 4.60 | IC.. |
| 8 | Cadillac.....V16-90 | 7545 | 154 | 7.50/17 | 16-3x4 | 57.6 | 452.0 | 185-3800 | 6.00 | 40.5 | Cl.. | Mor.. | Ala.. | Han.. | AC.. | DL.. | Own. | D... | D.... | dp.Own.. | Own. | Nb-Mec. | ¾ Own | 4.64 | IC.. |
| 9 | Chevrolet....Master | 667 | 112¼ | 6.00/16 | 6-3 1/16x3 1/4 | 29.4 | 216.5 | 85-3200 | 6.25 | 35.4 | Cl.. | Own. | Cl... | No... | AC.. | Car.. | Own. | D... | D.... | P.Own.. | Own. | m-Own.. | ½ Own | 3.73 | C... |
| 10 | Chevrolet..Mas.DeL. | 739 | 112¼ | 6.00/16 | 6-3 1/16x3 1/4 | 29.4 | 216.5 | 85-3200 | 6.25 | 39.0 | Cl.. | Own. | Cl... | No... | AC.. | Car.. | Own. | D... | D.... | P.Own.. | Own. | m-Own.. | ½ Own | 4.22 | IC.. |
| 11 | Chrysler...Roy. C-16 | 910 | 116 | 6.25/16 | 6-3 5/16x4 1/4 | 27.3 | 228.1 | 93-3600 | 6.50 | 38.8 | Cl°. | Mor.. | Ala.. | Pur.. | Bur. | Car.. | NS.. | A... | Wil.. | P.B&B.. | Own. | Nb-UP.. | ½ Own | 4.10 | IC.. |
| 12 | Chrysler...Imp. C-14 | 1100 | 121 | 6.50/16 | 8-3 1/4x4 1/8 | 33.8 | 273.8 | 110-3600 | 6.70 | 41.7 | Al.. | Mor.. | Ala.. | Pur.. | AC. | Str... | NS.. | A... | Wil.. | P.B&B.. | Own. | Nb-UP.. | ½ Own | 4.10 | IC.. |
| 13 | Chrysler.Cus.Im.C-15 | 2060 | 140 | 7.50/16 | 8-3 1/4x4 7/8 | 33.8 | 323.5 | 130-3400 | 6.50 | .... | Al.. | Mor.. | Ala.. | Pur.. | AC. | Str... | NS.. | A... | Wil.. | P.B&B.. | WG.. | Nb-UP.. | ½ Own | 4.55 | IC.. |
| 14 | Chrysler.Airflow C-17 | 1610 | 128 | 7.50/16 | 8-3 1/4x4 7/8 | 33.8 | 323.5 | 130-3400 | 6.50 | 40.3 | Al.. | Mor. | Ala.. | Pur.. | AC. | Str... | Bur. | A... | Wil.. | P.B&B.. | WG.. | Nb-UP.. | ½ Own | 4.30 | C... |
| 15 | Cord.....812 | (i) | 125-132 | 6.50/16 | 8-3 1/16x3 3/4 | 39.2 | 288.6 | 115-3600 | 6.32 | 40.3 | Al.. | Whit. | Al... | No... | AC.. | Str... | NS.. | A... | USL. | P.Long.. | Own. | Ben.... | Tu Own | 4.70 | IT.. |
| 16 | Cord.....S.C. 812 | (j) | 125-132 | 6.50/16 | 8-3 1/16x3 3/4 | 39.2 | 288.6 | 175-4200 | 6.32 | 40.3 | Al.. | Whit. | Als.. | No... | AC.. | Str... | Pratt. | A... | USL. | P.Long.. | Own. | Ben.... | Tu Own | 4.70 | IT.. |
| 17 | De Soto.....S-3 | 870 | 116 | 6.00/16 | 6-3 5/16x4 1/4 | 27.3 | 228.1 | 93-3600 | 6.50 | 39.0 | Cl°. | Mor. | Ala.. | Pur.. | Bur. | Car.. | NS.. | A... | Wil.. | P.B&B.. | Own. | Nb-UP.. | ½ Own | 4.10 | IC.. |
| 18 | Dodge.....Six | 820 | 115 | 6.00/16 | 6-3 1/4x4 3/8 | 25.3 | 217.8 | 87-3600 | 6.50 | 38.7 | Cl.. | Mor.. | Als.. | Pur.. | AC.. | Str... | NS.. | A... | Wil.. | P.B&B.. | Own. | Nb-UP.. | ½ Own | 4.10 | C... |
| 19 | Duesenberg.....J | ..... | 142-153½ | 7.00/19° | 8-3 3/4x4 3/4 | 45.0 | 419.7 | 320-4200 | 5.20 | .... | Cl.. | LB... | Al... | Pur.. | Yes. | Str... | ..... | D... | Exi.. | dpLong.. | Own. | m-Spi... | ½ Own | .... | C... |
| 20 | Ford.....V8-60 | 604‡ | 112 | 5 50/16 | 8-2.6x3.2 | 21.6 | 136.0 | 60-4200 | 6.6 | 30.4 | Al.. | Gear. | CS... | No.. | Yes. | Str... | Own. | O... | Own. | P..... | Own. | m-Spi... | ¾ Own | 4.44 | Tr.. |
| 21 | Ford.....V8-85 | 645‡ | 112 | 6.00/16 | 8-3 1/16x3 3/4 | 30.0 | 221.0 | 85-3800 | 6.12 | 37.9 | Al.. | Gear. | CS... | No.. | Yes. | Str... | Own. | O... | Own. | P.Os.... | Own. | m-Spi... | ¾ Own | 3.78 | Tr.. |
| 22 | Graham.....85 | 770 | 111 | (s) | 6-3x4 | 21.6 | 169.6 | 70-3500 | 6.80 | 35.7 | Al.. | LB... | Als.. | No... | Bur. | Mar.. | Old.. | D... | Wil.. | P.III.... | WG.. | Nb-UP.. | ½ Spi.. | 4.55 | C... |
| 23 | Graham.....95 | 905 | 116 | 6.00/16 | 6-3 1/4x4 | 25.3 | 199.1 | 85-3800 | 6.70 | 37.9 | Al.. | LB... | Als.. | No... | Bur. | Mar.. | Old.. | D... | Wil.. | P.Long.. | WG.. | Nb-UP.. | ½ Spi.. | 4.45 | C... |
| 24 | Graham.....S.C. 116 | 1050 | 116 | 6.25/16 | 6-3 1/4x4 | 25.3 | 199.1 | 106-4000 | 6.70 | .... | Al.. | LB... | Als.. | Fram | Bur. | Mar.. | Old.. | D... | Wil.. | P.Long.. | WG.. | Nb-UP.. | ½ Spi.. | 4.27 | C... |
| 25 | Graham.....S.C. 120 | 1160 | 116-120 | 6.50/16 | 6-3 1/4x4 3/8 | 25.3 | 217.8 | 116-4000 | 6.70 | .... | Al.. | LB... | Als.. | Fram | Bur. | Mar.. | Old.. | D... | Wil.. | P.Long.. | WG.. | Nb-UP.. | ½ Spi.. | 4.27 | C... |
| 26 | Hudson.....6-73 | 945 | 122 | 6.00/16 | 6-3x5 | 21.6 | 212.0 | 101-4000 | 6.25 | 36.8 | Cl°. | Ge°.. | Al... | No... | AC.. | Car.. | Old.. | A... | Nat.. | P.Own†. | Own. | Nb-Spi... | ½ Own | 4.11 | C... |
| 27 | Hudson..8, 74-5-6-7 | 1010 | 122, 129 | 6.25/16 | 8-3x4½ | 28.8 | 254.0 | 122-4200 | 6.25 | 41.2 | Cl°. | Ge°.. | Al... | No... | AC.. | Car.. | Old.. | A... | Nat.. | P.Own†. | Own. | Nb-Spi... | ½ Own | 4.11 | C... |
| 28 | Hupmobile.....Six | ..... | ..... | 6.25/16 | 6-3 1/2x4 1/4 | 29.4 | 245.3 | 101-3600 | 5.75 | ..... | ..... | Mor.. | Al... | ..... | AC.. | Car.. | ..... | A... | Wil. | ..... | WG.. | ..... | ½ Spi.. | 4.54 | C... |
| 29 | Hupmobile.....Eight | ..... | ..... | 6.50/16 | 8-3 1/16x3 3/4 | 32.5 | 303.2 | 120-3600 | 5.80 | ..... | ..... | Mor.. | Al... | ..... | AC.. | Car.. | ..... | A... | Wil. | ..... | WG.. | ..... | ½ Spi.. | 4.54 | C... |
| 30 | La Salle...V8, 37-50 | 1260 | 124 | 7.00/16 | 8-3 5/16x4 1/2 | 36.4 | 322.0 | 125-3400 | 6.25 | 41.0 | Cl.. | Mor.. | Ala.. | Han.. | AC.. | SC... | Old.. | D... | Del.. | P.Long.. | Own. | Nb-Mec. | ½ Own | 3.92 | IC.. |
| 31 | Lincoln.....V12 | 4450‡ | 136-145 | 7.50/17 | 12-3 1/8x4 1/2 | 46.8 | 414.0 | 150-3400 | 6.38 | 38.9 | Al.. | Ch.. | Ala.. | Pur.. | Yes. | Str... | Own. | A... | Exi.. | P.Long.. | Own. | m-Spi... | FF Tim | 4.58 | C... |
| 32 | Lincoln-Zephyr..... | 1265‡ | 122 | 7.00/16 | 12-2 3/4x3 3/4 | 36.3 | 267.3 | 110-3900 | 6.7 | 42.6 | Al.. | Gear. | CS... | No.. | Yes. | Str... | Own. | O... | Own. | P.Os.... | Own. | m-Own.. | ¾ Own | 4.44 | Tr.. |
| 33 | Nash...Amb. 6, 3720 | 960 | 121 | 6.25/16 | 6-3 5/16x4 3/8 | 27.3 | 234.8 | 93-3400 | 5.67 | 36.2 | Cl.. | Whit. | Als.. | BS... | AC. | Str... | Wal.. | A... | USL. | P.B&B.. | Ot... | Nb-Mec. | ½ Own | 4.11 | C... |
| 34 | Nash...Amb. 8, 3780 | 1080 | 125 | 7.00/16 | 8-3 1/16x4 1/4 | 31.2 | 260.8 | 105-3400 | 5.64 | 35.5 | Cl.. | Dia.. | Als.. | BS... | Bur. | Str... | Wal.. | A... | USL. | P.B&B.. | Ot... | Nb-Mec. | ½ Own | 4.10 | C... |
| 35 | Nash Lafay 400-3710 | 810 | 117 | 6.00/16 | 6-3 5/16x4 3/8 | 27.3 | 234.8 | 90-3400 | 5.61 | 37.4 | Cl.. | Whit. | Als.. | ..... | Bur. | Str... | Wal.. | A... | USL. | P.B&B.. | Ot... | Nb-Mec. | ½ Own | 4.11 | C... |
| 36 | Oldsmobile.....F37 | 875 | 117 | 6.50/16 | 6-3 7/16x4 1/8 | 28.4 | 229.7 | 95-3400 | 6.10 | 38.1 | Cl.. | Whit. | Ala.. | No... | AC.. | Car.. | Var.. | D... | D.... | P.B&B.. | Own. | Nb-Mec. | ½ Own | 4.37 | IC.. |
| 37 | Oldsmobile.....L37 | 990 | 124 | 7.00/16 | 8-3 1/4x3 7/8 | 33.8 | 257.1 | 110-3600 | 6.20 | 39.1 | Cl.. | LB... | Ala.. | No... | AC. | Car.. | Var.. | D... | D.... | P.B&B.. | Own. | Nb-Mec. | ½ Own | 4.37 | IC.. |
| 38 | Packard.....Six | 1175 | 122 | 6.50/16 | 6-3 1/16x4 1/4 | 29.4 | 245.3 | 100-3600 | 6.52 | 39.7 | Cl.. | Mor.. | Als.. | ..... | AC. | CG.. | Old.. | D... | Wil.. | P..... | Own. | Nb-Mec. | ½ Own | 4.54 | IC.. |
| 39 | Packard.....Eight | 1325 | 127-148 | 7 00/16 | 8-3 1/4x4 1/4 | 33.8 | 282.0 | 120-3800 | 6.60 | 40.7 | Al.. | Mor.. | Als.. | ..... | AC. | Str... | Old.. | A... | Del.. | P..... | Own. | Nb-Mec. | ½ Own | 4.36 | IC.. |
| 40 | Packard.....Super 8 | 2790 | 127-34-39 | 7.50/16 | 8-3 5/8x5 | 32.5 | 320.0 | 130-3200 | 6.50 | 41.0 | Al.. | Mor.. | Als.. | Pur.. | AC. | Str... | Old.. | A... | PD.. | P..... | Own. | Nb-UP.. | ½ Own | 4.69 | IC.. |
| 41 | Packard.....Twelve | 4155 | 144 | 8.25/16 | 12-3 7/16x4 1/4 | 56.7 | 473.0 | 175-3200 | 6.40 | 46.8 | Al.. | Mor. | Als.. | Pur.. | AC. | Str... | Old.. | A... | PD.. | P..... | Own. | Nb-Spi... | ½ Own | 4.41 | IC.. |
| 42 | Pierce-Arrow...1701 | 3375 | 138-144 | 7.00/17 | 8-3 1/2x5 | 39.2 | 385.0 | 150-3400 | 6.40 | 37.6 | Al.. | Whit. | Als.. | Pur.. | AC. | Str... | Buf.. | D‡.. | Wil.. | P.Long.. | WG.. | Nb-UP.. | ½ Own | 4.58 | C... |
| 43 | Pierce-Arrow...1702 | 3895 | 138-144 | 7.50/17 | 12-3 1/2x4 | 58.8 | 462.0 | 185-3400 | 6.40 | 42.0 | Al.. | Whit. | Als.. | Pur.. | AC. | Str... | Buf.. | D‡.. | Wil.. | P.Long.. | WG.. | Nb-UP.. | ½ Own | 4.58 | C... |
| 44 | Pierce-Arrow...1703 | 5015 | 147 | 7.50/17 | 12-3 1/2x4 | 58.8 | 462.0 | 185-3400 | 6.40 | 40.7 | Al.. | Wh t. | Als.. | Pur.. | AC. | Str... | Buf.. | D‡.. | Wil.. | P.Long.. | WG.. | Nb-UP.. | ½ Own | 4.58 | C... |
| 45 | Plymouth.....P3 | 665 | 112 | 5.50/16 | 6-3 1/8x4 3/8 | 23.4 | 201.3 | 82-3600 | 6.70 | 36.7 | Cl.. | Mor.. | Ala.. | No... | BA.. | Car.. | NS.. | A... | Wil.. | P.B&B.. | Own. | Nb-UP.. | ½ Own | 3.90 | C... |
| 46 | Plymouth.....P4 | 745 | 112 | 6.00/16 | 6-3 1/8x4 3/8 | 23.4 | 201.3 | 82-3600 | 6.70 | 36.5 | Cl.. | Mor.. | Ala.. | Pur.. | BA.. | Car.. | NS.. | A... | Wil.. | P.B&B.. | Own. | Nb-UP.. | ½ Own | 4.10 | C... |
| 47 | PontiacDeL.6,37-26CA | 836 | 117 | 6.00/16 | 6-3 7/16x4 | 28.3 | 222.7 | 85-3600 | 6.20 | 38.5 | Cl.. | Mor.. | CHI.. | No... | AC.. | Car.. | BO.. | D... | Del.. | P.Own.. | Own. | Nb-Mec. | ½ Own | 4.37 | IC.. |
| 48 | Pontiac DeL.8,37-28A | 894 | 122 | 6.50/16 | 8-3 1/4x3 3/4 | 33.8 | 248.9 | 99-3800 | 6.20 | 40.5 | Cl.. | Mor. | CHI.. | No... | AC.. | Car.. | BO.. | D... | Del.. | P.Own.. | Own. | Nb-Mec. | ½ Own | 4.37 | IC.. |
| 49 | Studebaker.Com. Six | ..... | 116 | 6.00/16 | 6-3 1/8x4 3/8 | 26.3 | 226.0 | 90-3400 | 6.09 | 40.2 | Cl.. | Dia.. | Ly... | Fram | AC.. | Str... | Buf.. | A... | Wil.. | P.B&B.. | WGo | Ru-Th.. | ½ Spi.. | 4.55 | IT.. |
| 50 | Studebaker...Pres. 8 | ..... | 122 | 6.50/16 | 8-3 1/16x4 1/4 | 30.0 | 250.4 | 110-3600 | 6.00 | 39.9 | Cl.. | Dia.. | Ly... | Fram | AC.. | Str... | Bur. | D... | Wil.. | P.Long.. | WGo | Nb-Spi.. | ½ Spi.. | 4.55 | IT.. |
| 51 | Terrap..DeL.&Sup.6 | 790 | 117 | 6.00/16 | 6-3x5 | 21.6 | 212.0 | 96-3900 | 6.25 | 38.3 | Cl°. | Ge... | Al... | No... | AC.. | Car.. | Old.. | A... | Nat.. | P.Own†. | Own. | Nb-Spi... | ½ Own | 4.11 | C... |
| 52 | Willys.....38 | ..... | 100 | 5.50/16 | 4-3 1/8x4 3/8 | 15.6 | 134.2 | 48-3200 | 5.70 | 32.2 | Cl.. | LB... | Cl... | No... | AC. | Til.. | Buf.. | A... | USL. | P.B&B.. | WG.. | m-UP.. | ½ Own | 4.30 | C... |

**ABBREVIATIONS—General**

○—Others also
•—Measured on rim of Flywheel
½—Semi-floating
¾—Three-quarter floating
†—Power Clutch
††—With clearance of .015 the valve is .004 off its seat.
‡—Does not include Federal Taxes
§—Computed on basis of displacement, gear ratio, effective tire diameter, and weight with normal load.

(a)—(−¼ to +½)
**A**—Above (rods removed from)
**A**—After top center
**AA**—Automatic adjuster
**Ad**—Advanced **Al**—Aluminum
**Ala**—Aluminum, Anode processed
**Als**—Aluminum with struts
**Au**—Automatic **(b)**—0 to −½
**B**—Below (rods removed from)
**B**—Before top center
**Bm**—Before marks on vibration damper
(c)—60, ¼−1; 65, −¼ to +¼

**C**—Conventional
**C**—Cold (Tappet clearance)
**Ch**—Chain
**CHI**—Chrome Nickel Iron
**Cl**—Cast Iron **CS**—Cast Steel
(d)—60, ¼−1; 65, 0 to ½
**dp**—Double plate clutch
(e)—60, 4°51′; 65, 5°38′
(f)—60-1660, 65-2090
**F**—Floating (Piston Pin)
**FF**—Full floating
(g)—60, 155X; 65, 170X
(h)—70-2535, 75-2815

**H**—Hot (tappet clearance)
(i)—2445-2860 **IC**—Independent coil
**IT**—Independent Transverse
(j)—2960-3375
(k)—Intake, .0125—Exhaust, .0156
**Ly**—Lynite **m**—Metal
**M**—Mechanical **N**—Negative
(n)—Intake, .0124—Exhaust, .0156
**Nb**—Needle bearing
**o**—Automatic shift optional
**Ot**—Overdrive transmission
**P**—Piston (Pin Locked in)
**P**—Single plate clutch

**PH**—Power operated, hydraulic brakes **R**—Rod (Pin locked in)
(r)—Out only **Ru**—Rubber
(s)—2 door sedan 5.25/17, 4 door sedan 6.00/16
(t)—60, 7.00/16; 65, 7.50/16
**TC**—Top Center
**Tr**—Transverse **Tu**—Tubular
(u)—60, 3.69; 65, 4.30
(v)—70, 4.30; 75, 4.60
**Var**—Various
**x**—At 1000 R.P.M.
**y**—At 2800 R.P.M.

# Tune-Up Specifications

Car Manufacturers and Supersede All Others Previously Published

| Service Brake Make and Type | Steering Gear Make | Compression Pressure at Cranking Speed (Lbs.) | Spark Plug Make and Type | RINGS: No. and Width Comp. | RINGS: No. and Width Oil | Piston Pin Diameter | Piston Pin Locked in | VALVES: Head Diameter and Seat Angle: Inlet (Ins.) | Inlet Seat Angle (Degrees) | Exhaust (Ins.) | Exhaust Seat Angle (Degrees) | Stem Diameter (Ins.) | Operating Tappet Clearance: Inlet | Exhaust | Inlet Tappet Clearance for Valve Timing | Intake Valve Opens Before or After T.C.: No. of Degrees | No. of Flywheel Teeth | IGNITION: Breaker Points Gap (Ins.) | Spark Plug Gap (Ins.) | Timing: Spark Occurs °TC | No. of Flyw. Teeth Spark Occurs TC | Breaker Housing | Rods Removed From | Crankpin Diameter (Ins.) | Crankpin Length (Ins.) | Capacity Crankcase (Qts.) | Capacity Cooling System (Qts.) | FRONT AXLE: Caster (Degrees) | Camber (Degrees) | Toe-In (Inches) | King Pin Inclination (Degrees) | Line Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OH | S... | 106 | AC-H9.... | 2-$\frac{3}{32}$ | 2-$\frac{3}{16}$ | $\frac{13}{16}$ | R.. | $1\frac{11}{32}$ | 45 | $1\frac{13}{32}$ | 45 | .372 | .015H | .015H | †† | 13B... | $5\frac{1}{4}$B | .015 | .025 | 6B... | $2\frac{1}{2}$B. | Au. | A. | 2 | $1\frac{7}{32}$ | 6 | $13\frac{1}{4}$ | $\frac{1}{4}\pm\frac{3}{16}$ | -$\frac{1}{4}$, +1 | 0-$\frac{1}{16}$ | $3\frac{1}{2}$-$4\frac{1}{2}$ | 1 |
| OH | S... | 106 | AC-H9.... | 2-$\frac{3}{32}$ | 2-$\frac{3}{16}$ | $\frac{7}{8}$ | R.. | $1\frac{11}{32}$ | 45 | $1\frac{13}{32}$ | 45 | .372 | .015H | .015H | †† | 14B... | 6B... | .015 | .025 | 10B... | $4\frac{1}{2}$B. | Au. | A. | $2\frac{1}{4}$ | $1\frac{7}{32}$ | 8 | 17 | $\frac{1}{4}\pm\frac{3}{16}$ | -$\frac{1}{4}$, +1 | 0-$\frac{1}{16}$ | $3\frac{1}{2}$-$4\frac{1}{2}$ | 2 |
| OH | S... | 106 | AC-H9.... | 2-$\frac{3}{32}$ | 2-$\frac{3}{16}$ | $\frac{7}{8}$ | R.. | $1\frac{11}{32}$ | 45 | $1\frac{13}{32}$ | 45 | .372 | .015H | .015H | †† | 14B... | 6B... | .015 | .025 | 10B... | $4\frac{1}{2}$B. | Au. | A. | $2\frac{1}{4}$ | $1\frac{7}{32}$ | 8 | 17 | 0±$\frac{3}{4}$ | -$\frac{1}{4}$, +1 | 0-$\frac{1}{16}$ | $4\frac{1}{2}$-$5\frac{1}{2}$ | 3 |
| OH | S... | 106 | AC-H9.... | 2-$\frac{3}{32}$ | 2-$\frac{3}{16}$ | $\frac{7}{8}$ | R.. | $1\frac{11}{32}$ | 45 | $1\frac{13}{32}$ | 45 | .372 | .015H | .015H | †† | 14B... | 6B... | .015 | .025 | 10B... | $4\frac{1}{2}$B. | Au. | A. | $2\frac{1}{4}$ | $1\frac{7}{32}$ | 8 | 17 | 0±$\frac{3}{4}$ | -$\frac{1}{4}$, +1 | 0-$\frac{1}{16}$ | 4-5 | 4 |
| BH | S... | (g) | AC-K7.... | 2-$\frac{1}{8}$ | 2-$\frac{5}{32}$ | $\frac{7}{8}$ | F.. | 1.87 | 45 | 1.62 | 45 | .341 | AA... | AA.... | 0 | TC... | TC... | .015 | .027 | 5B... | $2\frac{1}{4}$B. | Ad. | A. | 2.46 | $2\frac{1}{32}$ | 7 | 25 | (c)..... | (d)..... | $\frac{1}{32}$-$\frac{3}{32}$ | (e).. | 5 |
| BH | S... | 170x | AC-K7.... | 2-$\frac{1}{8}$ | 2-$\frac{3}{32}$ | $\frac{7}{8}$ | F.. | 1.87 | 45 | 1.62 | 45 | .341 | AA... | AA.... | 0 | TC... | TC... | .015 | .027 | 5B... | $2\frac{1}{4}$B. | Ad. | A. | 2.46 | $2\frac{1}{32}$ | 7 | 25 | 0-±¼ | 0-$\frac{1}{2}$ | $\frac{1}{32}$-$\frac{3}{32}$ | 5°38′ | 6 |
| BH | S... | 145x | AC-G7.... | 3-$\frac{3}{32}$ | 1-$\frac{3}{32}$ | $\frac{7}{8}$ | P.. | 1.51 | 45 | 1.39 | 45 | .339 | AA... | AA.... | 0 | TC... | TC... | .021 | .025 | 10B... | 3B... | Ad. | B. | $2\frac{1}{4}$ | $2\frac{1}{4}$ | 9 | 17 | 0-±¼ | 0-$\frac{1}{2}$ | $\frac{1}{32}$-$\frac{3}{32}$ | 5°38′ | 7 |
| OP | S... | 154x | AC-G6.... | 3-$\frac{3}{32}$ | 1-$\frac{3}{32}$ | $\frac{7}{8}$ | P.. | 1.51 | 45 | 1.39 | 45 | .339 | AA... | AA.... | 0 | TC... | TC... | .016 | .025 | 4B... | $1\frac{1}{4}$B. | Ad. | B. | $2\frac{1}{2}$ | $2\frac{1}{4}$ | 10 | 24 | 0-±¼ | 0-$\frac{1}{2}$ | $\frac{1}{32}$-$\frac{3}{32}$ | 4 | 8 |
| OH | O... | 112 | AC-K11... | 2-$\frac{1}{8}$ | 1-$\frac{3}{32}$ | $\frac{7}{8}$ | R.. | $1\frac{11}{32}$ | 30 | $1\frac{13}{32}$ | 30 | $\frac{11}{32}$ | .006H | .013H | .006 | 9B.... | $3\frac{1}{4}$B. | .020 | .040 | 5B... | $1\frac{3}{4}$B. | Au. | A. | $2\frac{1}{16}$ | $1\frac{5}{16}$ | 5 | 14 | $2\frac{3}{4}$-±$1\frac{1}{2}$ | 1±$\frac{1}{16}$ | $\frac{1}{16}$-$\frac{1}{16}$ | 7°10′ | 9 |
| OH | O... | 112 | AC-K11... | 2-$\frac{1}{8}$ | 1-$\frac{3}{16}$ | $\frac{7}{8}$ | R.. | $1\frac{11}{32}$ | 30 | $1\frac{13}{32}$ | 30 | $\frac{11}{32}$ | .006H | .013H | .006 | 9B.... | $3\frac{1}{4}$B. | .020 | .040 | 5B... | $1\frac{3}{4}$B. | Au. | A. | $2\frac{1}{16}$ | $1\frac{5}{16}$ | 5 | 14 | 0 | ¼-$\frac{3}{4}$ | $\frac{1}{16}$-$\frac{1}{32}$ | 7¾ | 10 |
| LH | G... | 155x | Ch-J-8.... | 2-$\frac{1}{8}$ | 2-$\frac{3}{32}$ | $\frac{13}{16}$ | F.. | $1\frac{11}{32}$ | 45 | $1\frac{13}{32}$ | 45 | .340 | .008H | .010H | .014 | TC... | TC... | .020 | .025 | 2A... | ¾A.. | Au. | A. | $2\frac{1}{16}$ | $1\frac{1}{4}$ | 5 | 20 | $1\frac{1}{2}$ | (a) | 0-$\frac{1}{16}$ | $4\frac{1}{2}$-6 | 11 |
| LH | G... | 155x | Ch-H-10... | 2-$\frac{1}{8}$ | 2-$\frac{3}{32}$ | $\frac{13}{16}$ | F.. | $1\frac{11}{32}$ | 45 | $1\frac{13}{32}$ | 45 | .340 | .006H | .010H | .011 | 2B.... | ¾B.. | .018 | .025 | 3A... | $1\frac{1}{4}$A. | Au. | A. | $2\frac{1}{16}$ | $1\frac{5}{16}$ | 6 | 22 | $1\frac{1}{2}$ | (a) | 0-$\frac{1}{16}$ | $4\frac{1}{2}$-6 | 12 |
| LH | G... | 150x | Ch-H-10... | 2-$\frac{1}{8}$ | 2-$\frac{3}{32}$ | $\frac{13}{16}$ | F.. | $1\frac{11}{32}$ | 45 | $1\frac{13}{32}$ | 45 | .340 | .006H | .010H | .011 | 2B.... | ¾B.. | .018 | .025 | 5A... | 2A... | Au. | A. | $2\frac{1}{16}$ | $1\frac{5}{16}$ | 6 | 21 | 2 | (a) | 0-$\frac{1}{16}$ | $4\frac{1}{2}$-6 | 13 |
| LH | G... | 150x | Ch-H-10... | 2-$\frac{1}{8}$ | 2-$\frac{3}{32}$ | $\frac{13}{16}$ | F.. | $1\frac{11}{32}$ | 45 | $1\frac{13}{32}$ | 45 | .340 | .006H | .010H | .011 | 2B.... | ¾B.. | .018 | .025 | 5A... | 2A... | Au. | A. | $2\frac{1}{16}$ | $1\frac{5}{16}$ | 6 | 17 | 2 | ¼-¾ | 0-$\frac{1}{16}$ | $4\frac{1}{2}$-$5\frac{1}{2}$ | 14 |
| LH | G... | 110 | Ch-J-9.... | 2-$\frac{3}{32}$ | 2-$\frac{3}{32}$ | $\frac{7}{8}$ | F.. | $1\frac{13}{32}$ | 30 | $1\frac{13}{32}$ | 45 | .342 | .009 | .009 | .016 | $7\frac{1}{2}$B. | $3\frac{1}{2}$ | .015 | .025 | $3\frac{1}{2}$B. | $1\frac{1}{4}$.. | Au. | A. | 2 | $2\frac{3}{16}$ | 7 | 28 | 1-$2\frac{1}{2}$ | 1 | 0-$\frac{1}{16}$r | 8 | 15 |
| LH | G... | .... | Ch-H-10... | 2-$\frac{3}{32}$ | 2-$\frac{3}{32}$ | $\frac{7}{8}$ | F.. | $1\frac{13}{32}$ | 30 | $1\frac{13}{32}$ | 45 | .342 | .009 | .009 | .016 | $7\frac{1}{2}$B. | $3\frac{1}{2}$ | .015 | .025 | $3\frac{1}{2}$B. | $1\frac{1}{4}$.. | Au. | A. | 2 | $2\frac{1}{8}$ | 7 | 28 | 1-$2\frac{1}{2}$ | 1 | 0-$\frac{1}{16}$r | 6 | 16 |
| LH | G... | 155x | Ch-J-8.... | 2-$\frac{1}{8}$ | 2-$\frac{3}{32}$ | $\frac{13}{16}$ | F.. | $1\frac{11}{32}$ | 45 | $1\frac{13}{32}$ | 45 | .340 | .008H | .010H | .014 | TC... | TC... | .020 | .025 | 2A... | ¾A.. | Au. | A. | $2\frac{1}{16}$ | $1\frac{1}{4}$ | 5 | 20 | $1\frac{1}{2}$ | (a) | 0-$\frac{1}{16}$ | $4\frac{1}{2}$-6 | 17 |
| LH | O... | 140x | Ch-J-8.... | 2-$\frac{1}{16}$ | 2-$\frac{3}{32}$ | $\frac{13}{16}$ | F.. | $1\frac{11}{32}$ | 45 | $1\frac{13}{32}$ | 45 | .340 | .006H | .008H | .011 | 6A.... | $2\frac{1}{2}$A | .020 | .025 | 4A... | $1\frac{1}{2}$A | Au. | A. | $2\frac{1}{16}$ | 1 | 5 | 16 | 2 | ¼-¾ | 0-$\frac{1}{16}$ | $4\frac{1}{2}$-$5\frac{1}{2}$ | 18 |
| PH | R... | .... | Ch-6M.... | 3-$\frac{1}{8}$ | 1-$\frac{5}{16}$ | $1\frac{1}{16}$ | F.. | $1\frac{1}{2}$ | 30 | $1\frac{7}{16}$ | 30 | $\frac{11}{32}$ | .015C | .015C | .025 | 6B.... | 2B... | .021 | .025 | $1\frac{1}{2}$°B° | ..... | Ad. | .. | $2\frac{7}{16}$ | $1\frac{3}{4}$ | 12 | 32 | 3 | 1 | ¼ | .... | 19 |
| OM | O... | 150y | Ch-H-10.. | 2-$\frac{7}{32}$ | 1-$\frac{5}{32}$ | .687 | F.. | 1.28 | 45 | 1.28 | 45 | .279 | .013C | .013C | .013 | 9½B. | ..... | .015 | .025 | 4B... | ..... | Au. | .. | 1.60 | 1.54 | 4 | 15.2 | 8 | 1 | $\frac{1}{16}$-$\frac{1}{8}$ | 8 | 20 |
| OM | O... | 100 | Ch-7..... | 2-$\frac{3}{32}$ | 1-$\frac{3}{32}$ | .750 | F.. | $1\frac{11}{32}$ | 45 | $1\frac{13}{32}$ | 45 | .310 | .013C | .013C | .013 | 9½B. | 3B... | .015 | .025 | 4B... | $1\frac{1}{4}$B. | Au. | A. | 2 | $1\frac{1}{16}$ | 5 | 22 | 8 | 1 | $\frac{1}{16}$-$\frac{1}{8}$ | 8 | 21 |
| OH | R... | 115 | Ch-7..... | 2-$\frac{3}{32}$ | 1-$\frac{3}{16}$ | $\frac{13}{16}$ | R.. | $1\frac{23}{64}$ | 30 | $1\frac{13}{64}$ | 45 | $\frac{5}{16}$ | .010H | .010H | .012 | 4½B. | $1\frac{1}{2}$B. | .018 | .025 | 2B... | ¾B.. | .... | A. | $1\frac{13}{16}$ | $1\frac{5}{8}$ | 5 | 11 | 4½-5½ | 1 | $\frac{1}{16}$-$\frac{1}{8}$ | 7½ | 22 |
| OH | R... | 120 | Ch-J-9.... | 2-$\frac{3}{32}$ | 1-$\frac{3}{16}$<br>1-$\frac{5}{32}$ | $\frac{13}{16}$ | R.. | $1\frac{23}{64}$ | 30 | $1\frac{21}{64}$ | 45 | $\frac{5}{16}$ | .010H | .010H | .012 | 2A.... | ¾A.. | .018 | .025 | TC... | TC.... | .... | A. | $2\frac{1}{16}$ | $1\frac{5}{8}$ | 5 | 15 | 4-4½ | 1 | $\frac{1}{16}$-$\frac{1}{8}$ | 7½ | 23 |
| OH | R... | 120 | Ch-J-9.... | 2-$\frac{3}{32}$ | 1-$\frac{3}{16}$<br>1-$\frac{5}{32}$ | $\frac{13}{16}$ | R.. | $1\frac{23}{64}$ | 30 | $1\frac{21}{64}$ | 45 | $\frac{5}{16}$ | .010H | .010H | .012 | 4½B. | $1\frac{1}{2}$B. | .018 | .025 | 4A... | $1\frac{1}{2}$A. | .... | A. | $2\frac{1}{16}$ | $1\frac{5}{8}$ | 5 | 15 | 3-4 | 1 | $\frac{1}{16}$-$\frac{1}{16}$ | 7½ | 24 |
| OH | R... | 120 | Ch-J-9.... | 2-$\frac{3}{32}$ | 1-$\frac{3}{16}$<br>1-$\frac{5}{32}$ | $\frac{13}{16}$ | R.. | $1\frac{23}{64}$ | 30 | $1\frac{21}{64}$ | 45 | $\frac{5}{16}$ | .010H | .010H | .012 | 4½B. | $1\frac{1}{2}$B. | .018 | .025 | 4A... | $1\frac{1}{2}$A. | .... | A. | $2\frac{1}{16}$ | $1\frac{5}{8}$ | 5 | 15 | 3-4 | 1 | $\frac{1}{16}$-$\frac{1}{16}$ | 7½ | 25 |
| HM | G... | 110 | Ch-J-8.... | 2-$\frac{3}{32}$ | 2-$\frac{7}{16}$ | $\frac{3}{4}$ | F.. | $1\frac{5}{8}$ | 45 | $1\frac{5}{8}$ | 45 | $\frac{5}{8}$ | .006 | .008 | .010 | $10^2$-$\frac{3}{8}$B. | 4B... | .020 | .022 | TC... | TC... | Au. | A. | $1\frac{13}{16}$ | $1\frac{5}{8}$ | 5 | 13 | 0-½ | 1-$1\frac{1}{2}$ | 0-$\frac{1}{8}$ | 7 | 26 |
| HM | G... | 110 | Ch-H-10.. | 2-$\frac{3}{32}$ | 2-$\frac{7}{16}$ | $\frac{3}{4}$ | F.. | $1\frac{1}{2}$ | 45 | $1\frac{5}{8}$ | 45 | $\frac{5}{8}$ | .006 | .008 | .010 | $10^2$-$\frac{3}{8}$B. | 4B... | .020 | .022 | TC... | TC... | Au. | A. | $1\frac{13}{16}$ | $1\frac{5}{8}$ | 7 | 20 | 0-½ | 1-$1\frac{1}{2}$ | 0-$\frac{1}{8}$ | 7 | 27 |
| H | ..... | .... | Ch-7..... | 2-$\frac{1}{16}$ | 2-$\frac{5}{32}$ | $\frac{7}{8}$ | .... | $1\frac{23}{64}$ | 45 | $1\frac{17}{32}$ | 45 | .341 | ..... | ..... | ..... | ..... | ..... | .019 | .027 | ..... | ..... | ..... | ..... | $2\frac{1}{16}$ | $1\frac{5}{16}$ | 6 | 18 | $1\frac{1}{2}$ | 1 | ..... | ..... | 28 |
| H | ..... | .... | Ch-7..... | 2-$\frac{1}{16}$ | 2-$\frac{5}{32}$ | $\frac{7}{8}$ | .... | $1\frac{23}{64}$ | 45 | $1\frac{13}{32}$ | 45 | .341 | ..... | ..... | ..... | ..... | ..... | .016 | .027 | ..... | ..... | ..... | ..... | $2\frac{9}{16}$ | $1\frac{5}{32}$ | 8 | 21.5 | $1\frac{1}{2}$ | $1\frac{1}{4}$ | ..... | ..... | 29 |
| BH | S... | 155x | AC-K7.... | 2-$\frac{1}{8}$ | 2-$\frac{5}{32}$ | $\frac{7}{8}$ | F.. | $1\frac{7}{8}$ | 45 | $1\frac{5}{8}$ | 45 | .341 | AA.... | AA.... | AA.. | TC... | TC... | .015 | .026 | 5B... | $2\frac{1}{4}$B. | Ad. | A. | $2\frac{13}{32}$ | $2\frac{1}{32}$ | 7 | 25 | ¼-1 | ¼-1 | $\frac{1}{32}$-$\frac{3}{32}$ | 4°-51′ | 30 |
| OM | O... | 105 | Ch-7..... | 2-$\frac{1}{16}$ | 2-$\frac{5}{32}$ | $\frac{7}{8}$ | F.. | $1\frac{11}{16}$ | 45 | $1\frac{11}{16}$ | 45 | $\frac{5}{16}$ | .004C | .006C | .004 | 21B... | $6\frac{3}{4}$B. | .015 | .022 | 7B... | $2\frac{1}{4}$B. | Au. | B. | $2\frac{1}{2}$ | 2 | 12 | 32 | 8 | 1 | $\frac{1}{16}$-$\frac{1}{8}$ | 7½ | 31 |
| OM | O... | 100 | Ch-H-10.. | 2-$\frac{3}{32}$ | 1-$\frac{3}{32}$ | $\frac{11}{16}$ | F.. | 1.54 | 45 | 1.54 | 45 | .311 | .013C | .013C | .... | 19½B. | 6¼B. | .015 | .029 | 4B... | $1\frac{1}{4}$B. | Au. | A. | $2\frac{1}{8}$ | 1.57 | 6 | 27 | 4 | ¾ | $\frac{1}{16}$-$\frac{1}{8}$ | 4 | 32 |
| BH | G... | 100 | AC-45.... | 2-$\frac{1}{8}$ | 2-$\frac{5}{32}$ | $\frac{7}{8}$ | F.. | $1\frac{3}{4}$ | 45 | $1\frac{15}{32}$ | 45 | .372 | .008H | .015H | .008H | 24B... | $4\frac{1}{4}$B. | .022 | .027 | 4Bm | $1\frac{1}{4}$B | Au. | A. | 2 | $1\frac{27}{64}$ | 7 | 17 | $2\frac{1}{2}$ | $1\frac{1}{2}$ | $\frac{1}{8}$ | 7 | 33 |
| BH | G... | 90 | AC-45.... | 2-$\frac{1}{8}$ | 1-$\frac{1}{8}$<br>1-$\frac{3}{16}$ | $\frac{7}{8}$ | F.. | $1\frac{31}{32}$ | 45 | $1\frac{15}{32}$ | 45 | .372 | .008H | .015H | .008H | 20B... | $7\frac{1}{2}$B. | .020 | .027 | 9Bm | $2\frac{1}{2}$B. | Au. | B. | 2 | $1\frac{15}{64}$ | 7 | 18 | 2 | $1\frac{1}{2}$ | $\frac{1}{8}$ | 7 | 34 |
| BH | G... | 100 | AC-G8.... | 2-$\frac{1}{8}$ | 2-$\frac{5}{32}$ | $\frac{7}{8}$ | F.. | $1\frac{31}{32}$ | 45 | $1\frac{15}{32}$ | 45 | .340 | .015 | .015 | .015 | 5A.... | $1\frac{1}{2}$A. | .022 | .025 | TC.. | TC... | Au. | A. | 2 | $1\frac{27}{64}$ | 6 | 20 | $2\frac{1}{2}$ | $1\frac{1}{2}$ | $\frac{1}{8}$ | 7 | 35 |
| BH | S... | 146x | AC-K9.... | 2-$\frac{1}{8}$ | 2-$\frac{3}{16}$ | $\frac{25}{64}$ | P.. | $1\frac{9}{16}$ | 30 | $1\frac{21}{64}$ | 45 | $\frac{11}{32}$ | .008H | .011 | (k) | 5B.... | 2B... | .020 | .040 | TC... | TC... | Au. | A. | $2\frac{1}{16}$ | $1\frac{5}{8}$ | 6 | 16 | 0—N¾ | $\frac{1}{8}$-1 | $\frac{1}{16}$-$\frac{3}{16}$ | 4°51′ | 38 |
| BH | S... | 152x | AC-K9.... | 2-$\frac{1}{8}$ | 2-$\frac{3}{16}$ | $\frac{25}{64}$ | P.. | $1\frac{9}{16}$ | 30 | $1\frac{21}{64}$ | 45 | $\frac{11}{32}$ | .008H | .011 | (n) | TC... | TC... | .015 | .030 | 2B... | ¾B.. | Au. | A. | $2\frac{1}{16}$ | $1\frac{5}{8}$ | 7 | 20 | 0—N¾ | $\frac{1}{8}$-1 | $\frac{1}{16}$-$\frac{3}{16}$ | 4°51′ | 37 |
| H | O... | ..... | AC-Y4 (z).. | 2-$\frac{1}{16}$ | 1-$\frac{3}{32}$ | $\frac{7}{8}$ | F.. | 1.57 | 30 | $1\frac{13}{32}$ | 45 | .340 | .007H | .010H | .... | 1B..... | ..... | .020 | .028 | 6B... | $1\frac{1}{2}$B. | Au. | .. | $2\frac{3}{32}$ | $1\frac{1}{4}$ | 6 | 15 | $1\frac{1}{2}\pm\frac{1}{16}$ | $\frac{1}{2}\pm\frac{1}{2}$ | 0±$\frac{1}{16}$ | 1° 54′ | 38 |
| H | O... | 110 | AC-Y4 (z).. | 2-$\frac{1}{16}$ | 1-$\frac{3}{32}$ | $\frac{7}{8}$ | F.. | $1\frac{1}{32}$ | 30 | $1\frac{13}{32}$ | 45 | .340 | .007H | .010H | .... | 1B..... | ..... | .015 | .028 | 8B... | $2\frac{3}{4}$B. | Au. | A. | $2\frac{3}{32}$ | $1\frac{1}{4}$ | 6 | 16 | $1\frac{1}{2}\pm\frac{1}{2}$ | $\frac{1}{2}\pm\frac{1}{2}$ | 0±$\frac{1}{16}$ | 1° 54′ | 39 |
| H | O... | 110 | AC-Y4 (z).. | 2-$\frac{1}{16}$ | 2-$\frac{3}{32}$ | $\frac{7}{8}$ | F.. | $1\frac{23}{64}$ | 45 | $1\frac{15}{32}$ | 45 | .340 | .006H | .008H | .... | 30B... | $9\frac{3}{4}$B. | .015 | .028 | 6B... | $2\frac{1}{2}$B. | Au. | B. | $2\frac{3}{32}$ | $1\frac{1}{32}$ | 8 | 20 | $2\frac{1}{2}\pm1\frac{1}{2}$ | $1\pm1\frac{1}{4}$ | $\frac{1}{16}\pm\frac{1}{16}$ | $1\frac{1}{2}$ | 40 |
| BPH | O... | 110 | AC-Y4 (z).. | 3-$\frac{1}{8}$ | 1-$\frac{3}{32}$ | $\frac{7}{8}$ | F.. | $1\frac{23}{64}$ | 45 | $1\frac{21}{64}$ | 45 | .340 | AA... | AA.... | .... | TC... | TC.. | .020 | .028 | 6B... | 2B... | Au. | B. | $2\frac{1}{2}$ | $1\frac{5}{8}$ | 10 | 40 | (b) | 1-±¼ | $\frac{1}{16}\pm\frac{1}{16}$ | $1\frac{1}{2}$ | 41 |
| Ste. | R... | 80 | Ch-J-6.... | 2-$\frac{1}{16}$ | 2-$\frac{5}{32}$ | $\frac{7}{8}$ | F.. | $1\frac{23}{64}$ | 45 | $1\frac{9}{16}$ | 45 | .372 | AA... | AA.... | .010 | 5A.... | $1\frac{1}{2}$A. | .018 | .025 | 2B... | ½B.. | Ad. | A. | $2\frac{1}{4}$ | $1\frac{1}{4}$ | 10 | 25 | $1\frac{1}{4}$ | 1 | $\frac{1}{8}$ | 8 | 42 |
| Ste. | R... | 85 | Ch-J-6.... | 2-$\frac{1}{16}$ | 2-$\frac{5}{32}$ | $\frac{7}{8}$ | F.. | $1\frac{23}{64}$ | 45 | $1\frac{9}{16}$ | 45 | .372 | AA... | AA.... | .004 | 19B... | 6B... | .018 | .025 | 5B... | $1\frac{1}{2}$B. | Ad. | A. | $2\frac{1}{8}$ | $1\frac{1}{4}$ | 13 | 38 | $1\frac{1}{4}$ | 1 | $\frac{1}{8}$ | 8 | 43 |
| Ste. | R... | 85 | Ch-J-6.... | 2-$\frac{1}{16}$ | 2-$\frac{5}{32}$ | $\frac{7}{8}$ | F.. | $1\frac{23}{64}$ | 45 | $1\frac{9}{16}$ | 45 | .372 | AA... | AA.... | .004 | 19B... | 6B... | .018 | .025 | 5B... | $1\frac{1}{2}$B. | Ad. | A. | $2\frac{1}{8}$ | $1\frac{1}{8}$ | 13 | 38 | $1\frac{1}{4}$ | 1 | $\frac{1}{8}$ | 8 | 44 |
| LH | O... | 145x | Ch-J-8.... | 2-$\frac{1}{16}$ | 2-$\frac{5}{32}$ | $\frac{25}{64}$ | F.. | $1\frac{13}{32}$ | 45 | $1\frac{13}{32}$ | 45 | .340 | .006H | .008H | .011 | 6A.... | $2\frac{1}{2}$A. | .020 | .025 | 4A... | $1\frac{1}{2}$A. | Au. | A. | $1\frac{13}{16}$ | 1 | 5 | 15 | 1-3 | ¼-¾ | 0-$\frac{1}{16}$ | $4\frac{1}{2}$-$5\frac{1}{2}$ | 45 |
| LH | O... | 145x | Ch-J-8.... | 2-$\frac{1}{16}$ | 2-$\frac{5}{32}$ | $\frac{25}{64}$ | F.. | $1\frac{13}{32}$ | 45 | $1\frac{13}{32}$ | 45 | .340 | .006H | .008H | .011 | 6A.... | $2\frac{1}{2}$A. | .020 | .025 | 4A... | $1\frac{1}{2}$A. | Au. | A. | $1\frac{13}{16}$ | 1 | 5 | 15 | 1-3 | ¼-¾ | 0-$\frac{1}{8}$ | $4\frac{1}{2}$-$5\frac{1}{2}$ | 46 |
| HM | S... | 141x | AC-K7.... | 2-$\frac{1}{16}$ | 1-$\frac{3}{16}$ | $\frac{15}{16}$ | R.. | $1\frac{13}{32}$ | 30 | $1\frac{13}{32}$ | 45 | .310 | .012H | .012H | .015 | 5B.... | 2B... | .020 | .025 | 4B... | $1\frac{1}{2}$B. | Au. | A. | 2 | $1\frac{7}{16}$ | 6 | 16 | N$\frac{3}{4}$-$1\frac{1}{4}$ | ¾-$1\frac{1}{4}$ | 0-$\frac{1}{16}$ | $4\frac{1}{2}$-5 | 47 |
| HM | S... | 141x | AC-K7.... | 2-$\frac{1}{16}$ | 1-$\frac{3}{16}$ | $\frac{15}{16}$ | R.. | $1\frac{13}{32}$ | 30 | $1\frac{13}{32}$ | 45 | .310 | .012H | .012H | .015 | 5B.... | 2B... | .018 | .025 | 4B... | $1\frac{1}{2}$B. | Au. | A. | 2 | $1\frac{7}{16}$ | 7 | 19 | N$\frac{3}{4}$-$1\frac{1}{4}$ | ¾-$1\frac{1}{4}$ | 0-$\frac{1}{16}$ | $4\frac{1}{2}$-5 | 48 |
| LH | R... | 105 | Ch-8..... | 2-$\frac{1}{16}$ | 1-$\frac{3}{32}$ | $\frac{7}{8}$ | R. | $1\frac{15}{32}$ | 45 | $1\frac{9}{32}$ | 45 | $\frac{11}{32}$ | .016C | .016C | .020 | 15B... | $5\frac{1}{2}$B. | .020 | .025 | 2B... | ¾B. | Au. | A. | $2\frac{3}{32}$ | $1\frac{5}{8}$ | $5\frac{1}{2}$ | $14\frac{1}{2}$ | (a) | ½ | $\frac{1}{16}$-$\frac{7}{32}$ | $5\frac{1}{2}$ | 49 |
| LH | R... | 105 | Ch-8..... | 2-$\frac{1}{16}$ | 1-$\frac{3}{32}$ | $\frac{7}{8}$ | R. | $1\frac{15}{32}$ | 45 | $1\frac{9}{32}$ | 45 | $\frac{11}{32}$ | .016C | .016C | .020 | 15B... | $5\frac{1}{2}$B. | .020 | .025 | TC... | TC... | Au. | A. | $1\frac{7}{8}$ | $1\frac{3}{32}$ | 8 | 17 | (a) | ½ | $\frac{1}{16}$-$\frac{3}{32}$ | $5\frac{1}{2}$ | 50 |
| BH | G... | 110 | Ch-J-8.... | 2-$\frac{3}{32}$ | 2-$\frac{3}{16}$ | ¾ | F.. | $1\frac{5}{8}$ | 45 | $1\frac{5}{8}$ | 45 | $\frac{5}{8}$ | .006 | .008 | .010 | $10^2$-$\frac{3}{8}$B | 4B... | .020 | .022 | TC... | TC... | Au. | A. | $1\frac{13}{16}$ | $1\frac{5}{8}$ | 5 | 13 | 0-½ | 1-$1\frac{1}{2}$ | 0-$\frac{1}{8}$ | 7 | 51 |
| BM | G... | 87 | Ch-C-7.... | 3-$\frac{3}{32}$ | 1-$\frac{5}{16}$ | $\frac{15}{16}$ | F.. | $1\frac{11}{32}$ | 45 | $1\frac{13}{32}$ | 45 | .371 | .004H | .006H | .010 | TC... | TC... | .020 | .025 | 5A... | 1A... | Au. | A. | $1\frac{13}{16}$ | $1\frac{5}{16}$ | 4 | 11 | 3 | 2 | $\frac{3}{32}$ | $7\frac{1}{2}$ | 52 |

**MAKES OF UNITS**

‡—Owen-Dyneto for Generator and Starter
A—Autolite
AC—AC Spark Plug Co.
BA—Burgess or AC
B&B—Borg and Beck
BH—Bendix, Hydraulic
BM—B3ndix, Mechanical
BO—Buffalo or Oldberg
BPH—Bendix, power operated, hydraulic
BS—Briggs & Stratton
Buf—Buffalo Pressed Steel
Bur—Burgess Car—Carter
CG—Chandler-Groves
Ch—Champion
Col—Columbia
D—Delco-Remy
DA—Delco-Remy Generator and Starter, Auto.ite Coil and Distributor
Del—Delco
Dia—Continental Diamond Fiber
DL—Detroit Lubricator
Det—Detroit Exi—Exide
F-O—Float-O G—Gemmer
Ge—General Electric Co.
Han—Handy
HM—Bendix hydraulic and mechanical combined
Ill—Illinois
LB—Link Belt
LH—Lockheed hydraulic
Mar—Marvel Mec—Mechanics
Mor—Morse Chain Co.
Nat—National
NS—Noblitt Sparks
O—Own
OH—Own hydraulic
Old—Oldberg
OM—Own, mechanical
OP—Own, power operated
Os—Own, semi-centrifugal
PD—Presto-Lite or Delco
Pur—Purolator
R—Ross
S—Saginaw
SC—Stromberg or Carter
SM—Stromberg or Marvel
Spi—Spicer Ste—Stewart-Warner
Str—Stromberg
Th—Thompson Products
Til—Tillotson
Tim—Timken
UP—Universal Products
Wal—Walker
WG—Warner Gear
Whit—Whitney Wil—Willard
(z)—Or Champion

# Motor Car Price, Weight and Body Table

*Following are delivered prices at factory for cars with standard equipment and include all federal taxes with exception of Ford and Lincoln. Optional equipment, state or local taxes, transportation charges and finance charges are extra.*

| BODY, MAKE AND MODEL | Delivered Price | Shipping Weight |
|---|---|---|
| **BUICK** | | |
| Special 40 | | |
| Sport Sedan, 2d. | 981 | |
| Tour. Sedan, 2d. | 1006 | |
| Sport Sedan, 4d. | 1022 | |
| Tour. Sedan, 4d. | 1047 | |
| Bus. Coupe, 2d. | 945 | |
| Sport Coupe, 2d. | 1001 | |
| Conv. Coupe, 2d. | 1103 | |
| Conv. Phae.,4d. | 1406 | |
| Century 60 | | |
| Tour. Sedan, 2d. | 1256 | |
| Sport Sedan, 4d. | 1272 | |
| Tour. Sedan, 4d. | 1297 | |
| Sport Coupe, 2d. | 1226 | |
| Conv. Coupe, 2d. | 1359 | |
| Conv. Phae. 4d. | 1713 | |
| Roadmaster 80 | | |
| Phae., Conv., 4d. | 1983 | |
| Tour. Sedan, 4d. | 1645 | |
| For. Sed., Tk., 4d | 1758 | |
| Sport Sedan | 1645 | |
| Limited 90 | | |
| Tour. Sedan, 4d. | 2350 | |
| Lim. Trunk, 4d. | 2453 | |
| Tour. Sedan, 4d. | 2176 | |
| **CADILLAC** | | |
| *—5 Wheel Equipment | | |
| V8-Series 60 | | |
| *Tour. Sedan, 5p | 2085 | |
| V8-Series 65 | | |
| *Conv. Sedan, 5p | 2600 | |
| Tour. Sedan, 5p | 2285 | |
| T. Sed., 5p.(Div.) | 2360 | |
| V8-Series 75 | | |
| Conv. Coupe, 2p | 3380 | |
| Conv. Sed., Trk. | 3490 | |
| Coupe, 2p. | 3275 | |
| Coupe, 3-5p. | 3380 | |
| Town Sedan, 5p | 3635 | |
| Tour. Sedan, 5p | 3075 | |
| Tour. Sedan | 3155 | |
| Formal Sed., 5p | 3990 | |
| Formal Sed., 7p | 3990 | |
| Tour. Sedan, 7p | 3205 | |
| Livery Sed., 8p | 3105 | |
| Im. Tr. Sed., 7p | 3360 | |
| Liv. Imp. Tr., 8p | 3255 | |
| Town Car, 7p | 5115 | |
| 16-Series 90 | | |
| Conv. Coupe | 5440 | |
| Conv. Sed., Trk. | 6000 | |
| Coupe, 2p. | 5335 | |
| Coupe, 5p. | 5440 | |
| Town Sedan | 5695 | |
| Touring Sedan | 5135 | |
| Tour. Sed.,(Div.) | 5215 | |
| Formal Sed., 5p | 6050 | |
| Formal Sed., 7p | 6050 | |
| Tour. Sedan, 7p | 5265 | |
| Imp. Tr. Sed., 70 | 5420 | |
| Town Car, 7p | 7170 | |
| **CHEVROLET** | | |
| Master | | |
| Sedan, 4d. | 697 | 2845 |
| Coach, 2d. | 636 | 2800 |
| Twn.Sed.,Trk,2d | 654 | 2830 |
| Spt. Sed.,Trk.,4d | 715 | 2885 |
| Bus. Coupe, 2d. | 618 | 2770 |
| Cabriolet, 2d. | 724 | 2790 |
| Master De Luxe | | |
| Sedan, 4d. | 769 | 2935 |
| Coach, 2d. | 702 | 2910 |
| Tn. Sed., Trk., 2d. | 720 | 2935 |
| Spt.Sed.,Trk.,4d. | 787 | 2960 |
| Bus. Coupe, 2d. | 685 | 2840 |
| Sport Coupe, 2d | 723 | 2880 |
| **CHRYSLER** | | |
| Royal Six | | |
| Bus. Coupe, 2d. | 810 | 3049 |
| Coupe, 2d. | 860 | 3099 |
| Conv. Coupe | 1020 | 3274 |
| Tour. Bro., 2d. | 880 | 3094 |
| Brougham, 2d. | 870 | 3114 |
| Tour. Sedan, 4d. | 920 | 3134 |
| Sedan, 4d. | 910 | 3124 |
| Conv. Sedan | 1355 | 3484 |
| Sedan, 7p., 4d. | 1145 | 3544 |
| Sed. Lim., 7p., 4d | 1245 | |
| Imperial Eight | | |
| Bus. Coupe, 2d. | 1030 | 3374 |
| Coupe, 2d. | 1070 | 3449 |
| Tour. Bro., 2d. | 1070 | 3544 |
| Tour. Sedan, 4d. | 1100 | 3564 |
| Conv. Coupe | 1170 | 3609 |
| Conv. Sedan, 4d. | 1500 | 3824 |
| Custom Imp. 8 | | |
| Sedan, 4d., 7p. | 2060 | 4522 |
| Sed. Lim., 4d., 7p | 2160 | 4644 |
| Airflow | | |
| Sedan, 4d. | 1610 | 4300 |
| Coupe, 2d. | 1610 | 4225 |
| **CORD** | | |
| Westc. Sed., 4d. | 2445 | 3715 |
| Beverly Sed., 4d. | 2545 | 3800 |
| Conv. Coupe, 2d. | 2595 | 3815 |
| Con. Pha. Sed., 2d | 2645 | 3864 |
| Schd.Westh.Sed. | 2860 | 3765 |
| Schd. Bevly. Sed. | 2960 | 3850 |
| Schd. Conv. Cpe. | 3010 | 3865 |
| Schd. Conv. Sed. | 3060 | 3914 |
| Cus. Berline | 3060 | 4120 |
| Cus. Beverly | 2960 | 3900 |
| S. C. Berline | 3575 | 4170 |
| S. C. Beverly | 3375 | 3950 |
| **DE SOTO** | | |
| Bus. Coupe, 2d. | 770 | 3038 |
| Coupe, rumb., 2d | 820 | 3088 |
| Brougham, 2d. | 830 | 3123 |
| Tour. Bro., 2d. | 840 | 3148 |
| Sedan, 4d. | 870 | 3123 |
| Tour. Sedan, 4d. | 880 | 3148 |
| Conv. Coupe | 975 | 3225 |
| Conv. Sedan, 4d. | 1300 | 3441 |
| Sedan, 7p., 4d. | 1120 | 3451 |
| Limousine, 7p. | 1220 | |
| **DODGE** | | |
| Bus. Coupe, 2d. | 715 | 2902 |
| Coupe, 2d. | 770 | 2967 |
| Conv. Coupe, 2d. | 910 | 3057 |
| Sedan, 2d. | 780 | 2992 |
| Tour. Sedan 2d. | 790 | 2997 |
| Sedan, 4d. | 820 | 2982 |
| Tour. Sedan, 4d. | 830 | 2997 |
| Sedan, 4d., 7p. | 1075 | 3367 |
| Conv. Sedan, 4d. | 1230 | 3262 |
| Limousine, 4d. | 1175 | |
| **FORD** | | |
| V8-60 | | |
| Tudor Sedan | 579 | 2513 |
| Tud. Tour. Sed. | 604 | 2523 |
| Fordor Sedan | 639 | 2543 |
| Fordor Tr. Sed | 664 | 2553 |
| Coupe, 5W | 529 | 2383 |
| Standard V8-85 | | |
| Tudor Sedan | 610 | 2728 |
| Tud. Tour. Sed. | 635 | 2760 |
| Fordor Sedan | 670 | 2761 |
| Fordor Tr. Sed | 695 | 2778 |
| Coupe, 5W | 585 | 2608 |
| **FORD (Cont.)** | | |
| De Luxe V8-85 | | |
| Tudor Sedan | 673 | 2768 |
| Fordor Sedan | 733 | 2783 |
| Roadster | 693 | 2688 |
| Phaeton | 748 | 2803 |
| Coupe, 5W | 658 | 2618 |
| Tud. Tour. Sed. | 698 | 2791 |
| Fordor Tr. Sed. | 758 | 2808 |
| Cabriolet | 718 | 2728 |
| Conv. Sedan | 858 | 2973 |
| Conv. Cabriolet | 758 | 2748 |
| Club Coupe | 718 | 2728 |
| **GRAHAM** | | |
| Crusader Series 6-85 | | |
| Tour. Sedan, 2d. | 690 | 2660 |
| Tr. Sed., Trk., 2d | 720 | 2675 |
| Tour. Sedan, 4d. | 770 | 2695 |
| Tr. Sed., Trk., 4d | 795 | 2715 |
| Cavalier Series 6-95 | | |
| Bus. Coupe, 2d. | 850 | 2815 |
| Coupe, 2d. | 900 | 2880 |
| Conv. Coupe | 945 | |
| Tour. Sedan, 2d. | 875 | 2930 |
| Tr. Sed., Trk., 2d | 905 | 2960 |
| Tour. Sedan, 4d. | 905 | 2930 |
| Tr. Sed., Trk., 4d | 935 | 2945 |
| Supercharger Series 116 | | |
| Bus. Coupe, 2d. | 1015 | 2975 |
| Coupe, 2d. | 1045 | 3040 |
| Conv. Coupe | 1080 | |
| Tour. Sedan, 2d. | 1020 | 3105 |
| Tour. Sedan, 4d. | 1050 | 3125 |
| Tr. Sed., Trk., 2d | 1050 | 3105 |
| Tr. Sed., Trk., 4d | 1080 | 3125 |
| Cus. Su. Chr. Series 120 | | |
| Bus. Coupe, 2d. | 1105 | 3020 |
| Coupe, 2d. | 1135 | 3055 |
| Conv. Coupe | 1170 | |
| Tour. Sedan, 4d. | 1160 | 3200 |
| Tr. Sed., Trk., 4d | 1190 | 3200 |
| **HUDSON** | | |
| 6-73 | | |
| Bus. Coupe, 2d. | 870 | 2760 |
| Coupe, 3p., 2d. | 915 | 2805 |
| Brougham, 4d. | 930 | 2925 |
| Tour. Bro., 2d. | 955 | 2925 |
| Vict. Coupe 2d. | 960 | 2865 |
| Sedan, 4d. | 990 | 2990 |
| Tour. Sedan, 4d. | | 2990 |
| Conv. Coupe | 1025 | 2870 |
| Conv. Bro. | 1110 | 2945 |
| 8-74 De Luxe | | |
| Coupe, 3p, 2d. | 975 | 3010 |
| Brougham, 2d. | 1035 | 3105 |
| Vict. Coupe, 2d. | 1035 | 3055 |
| Tour. Bro., 2d. | 995 | 3105 |
| Sedan, 4d. | 1065 | 3135 |
| Tour. Sedan, 4d. | | 3135 |
| Conv. Coupe | 1105 | 3020 |
| Conv. Bro. | 1190 | 3125 |
| 8-75 Custom | | |
| Coupe, 3p, 2d. | 1095 | 3055 |
| Brougham, 4d. | 1150 | 3135 |
| Vict. Coupe, 2d. | 1145 | 3085 |
| Tour. Bro., 2d. | | 3135 |
| Sedan, 2d. | 1185 | 3195 |
| Tour. Sedan, 2d. | 1135 | 3195 |
| Conv. Coupe | 1220 | 3070 |
| Conv. Bro. | 1305 | 3160 |
| 8-76 De Luxe | | |
| Sedan, 4d. | 1090 | 3205 |
| Tour. Sedan, 4d. | 1100 | 3205 |
| 8-77 Custom | | |
| Sedan, 4d. | 1190 | 3260 |
| Tour. Sedan, 4d. | 1215 | 3260 |
| **LA SALLE** | | |
| Series 38-50 | | |
| Conv. Coupe | 1415 | |
| Conv. Sedan | 1820 | |
| Coupe | 1300 | |
| Tour. Sedan, 2d. | 1340 | |
| Tour. Sedan, 4d. | 1380 | |
| **LINCOLN** | | |
| V12—136 in. | wb. | |
| Conv. Roadster. | 4950 | 5335 |
| Coupe | 4950 | 5335 |
| Wilby Coupe | 5550 | |
| Sedan, 4d. | 4450 | 5690 |
| Brunn Vict. | 5550 | |
| V12—145 in. | wb. | |
| Wilby. Tour. | 5550 | |
| Jud. Berline | 5650 | 5850 |
| Jud. Berline | 5750 | |
| Jud. Sed. Lim. | 5950 | |
| Brunn Cabriolet | 6650 | 5835 |
| Brunn Cabriolet | 6750 | 5810 |
| Brunn Tour.Cab | 6950 | |
| Brunn Brougham | 6750 | 5530 |
| Sedan | 4750 | 5840 |
| Limousine | 4850 | 5935 |
| Conv. Sed. LeB. | 5450 | |
| Conv. Sed. LeB. | 5650 | |
| Wilby. Lim | 5850 | 6000 |
| Wilby Sport Sed. | 6850 | |
| Wilby. Panel Bro. | 7050 | |
| **LINCOLN-ZEPHYR** | | |
| Coupe, 3p, 2d. | 1165 | |
| Sedan, 4d. | 1265 | |
| Coupe-sedan, 2d. | 1245 | |
| Town Lim., 4d. | 1425 | |
| **NASH** | | |
| Lafayette-400 | | |
| Coupe, 2d. | 740 | 3140 |
| Coupe, 2d. | 795 | 3190 |
| A. P. Coupe | 805 | |
| Vict. Sedan, 2d. | 800 | 3200 |
| Sedan, 4d. | 845 | 3240 |
| Cabriolet, 2d. | 885 | 3180 |
| Ambassador Six | | |
| Coupe, 2d. | 935 | 3290 |
| Coupe, 2d. | 975 | 3340 |
| A. P. Coupe | 990 | |
| Vict. Sedan, 2d. | 975 | 3380 |
| Sedan, 4d. | 1025 | 3400 |
| Cabriolet, 2d. | 1040 | 3320 |
| Ambassador Eight | | |
| Coupe, 2d. | 1075 | 3590 |
| Coupe, 2d. | 1115 | 3640 |
| A. P. Coupe | 1130 | |
| Vict. Sedan, 2d. | 1115 | 3690 |
| Sedan, 4d. | 1165 | 3720 |
| Cabriolet 2d. | 1180 | 3640 |
| **OLDSMOBILE** | | |
| Six | | |
| Bus. Coupe, 2d. | 810 | 3220 |
| Club Coupe, 2d | 870 | 3210 |
| Sedan, 2d. | 870 | 3275 |
| Tr. Sed., Trk., 2d | 895 | 3275 |
| Sedan, 4d. | 920 | 3310 |
| Tr. Sed., Trk., 4d | 945 | 3295 |
| Conv. Coupe, 2d. | 965 | 3350 |
| Eight | | |
| Bus. Coupe, 2d. | 925 | 3395 |
| Club Coupe, 2d. | 985 | 3405 |
| Sedan, 2d. | 985 | 3480 |
| Tour. Sedan, 2d. | 1010 | 3480 |
| Sedan, 4d. | 1035 | 3510 |
| Tour. Sedan, 4d. | 1060 | 3495 |
| Conv. Coupe, 2d. | 1080 | 3530 |
| **PACKARD** | | |
| *—6 Wheel Equipment | | |
| Six-1600 | | |
| Tour. Sedan, 4d. | 1175 | 3525 |
| Tour. Sedan, 2d. | 1145 | 3475 |
| **PACKARD** *—6 Wheel Equipment (Cont.) | | |
| Club Coupe | 1120 | 3425 |
| Conv. Cpe., 2-4p. | 1235 | 3500 |
| Business Coupe | 1075 | 3450 |
| Chassis | 810 | 2485 |
| Eight-1601 | | |
| Tour. Sedan, 4d. | 1325 | 3650 |
| Tour. Sedan, 2d. | 1295 | 3600 |
| Club Coupe | 1270 | 3550 |
| Conv. Cpe., 2-4p. | 1365 | 3625 |
| Conv. Sedan | 1650 | 3775 |
| Bus. Coupe | 1225 | 3570 |
| Chassis | 960 | 2620 |
| Eight-De Luxe-1601-D | | |
| Tour. Sedan | 1540 | 3685 |
| Eight-1602 | | |
| Tour. Sedan, 7p. | 1955 | 4195 |
| Tour. Lim. | 2110 | 4245 |
| Super-Eight-1603 | | |
| Tour. Sedan, 4d. | 2790 | 4530 |
| Chassis | 2090 | 3300 |
| Super-Eight-1604 | | |
| Formal Sedan | 3710 | 4795 |
| Tour. Sedan, 4d. | 2995 | 4670 |
| Club Sedan | 2990 | 4600 |
| Coupe, 5p. | 2965 | 4595 |
| Coupe, 2-4p. | 2925 | 4585 |
| Conv. Cpe., 2-4p. | 3210 | 4580 |
| Victoria | 3670 | 4650 |
| Chassis | 2170 | 3375 |
| Super-Eight-1605 | | |
| Tour. Sedan, 7p. | 3165 | 4700 |
| Tour. Lim. | 3305 | 4815 |
| Conv. Sedan | 3970 | 4945 |
| Chassis | 2230 | 3430 |
| Twelve-1607 | | |
| Formal Sedan | 4865 | 5550 |
| Tour. Sed., 4d. | 4155 | 5525 |
| Club Sedan | 4255 | 5520 |
| Coupe, 5p | 4185 | 5415 |
| *Coupe, 2-4p. | 4135 | 5255 |
| *Conv. Cpe., 2-4p | 4370 | 5255 |
| *Victoria | 5230 | 5345 |
| Chassis | 2950 | 3910 |
| Twelve-1608 | | |
| Tour. Sedan, 7p. | 4485 | 5600 |
| Tour. Lim. | 4690 | 5660 |
| *Conv. Sedan | 5390 | 5680 |
| Chassis | 3140 | 3965 |
| **PIERCE-ARROW** | | |
| Eight Model 1701 | | |
| Sedan | 3375 | 5675 |
| Club Sedan | 3480 | 5600 |
| Coupe | 3375 | 5645 |
| Conv. Roadster | 3480 | 5590 |
| Club Berline | 3630 | |
| Formal Sedan | 3630 | |
| Sedan, 7 p. | 3690 | 5820 |
| Enc. Dr. Lim. | 3840 | 5860 |
| Brunn Town Bro. | 5520 | 5840 |
| Conv. Sedan | 4300 | |
| Sedan, 7p. | | 5725 |
| Twelve Model 1702 | | |
| Sedan | 3895 | 5920 |
| Club Sedan | 4000 | 5850 |
| Coupe | 3895 | 5855 |
| Conv. Roadster | 4000 | 5800 |
| Club Berline | 4155 | |
| Formal Sedan | 4155 | |
| Sedan, 7 p. | 4210 | 6065 |
| Enc. Dr. Lim. | 4360 | 6105 |
| Brunn Town Bro. | 6040 | 6085 |
| Conv. Sedan | 4820 | 5921 |
| Twelve 1703 | | |
| Sedan | 5015 | 6125 |
| Enc. Dr. Lim. | 5220 | 6145 |
| **PLYMOUTH** | | |
| Six P3 | | |
| Coupe, 2d. | 580 | 2771 |
| Sedan, 2d. | 620 | 2841 |
| Sedan, 4d. | 665 | 2841 |
| De Luxe Six-P4 | | |
| Coupe, 2p. | 650 | 2839 |
| Coupe, 2-4p. | 700 | 2884 |
| Conv. Coupe, 2d. | 830 | 2994 |
| Sedan, 2d. | 715 | 2899 |
| Sedan, 4d. | 745 | 2914 |
| Tour. Sedan, 2d. | 725 | 2914 |
| Tour. Sedan, 4d. | 755 | 2914 |
| Sedan, 7p. | 995 | 3333 |
| Sedan Lim. | 1095 | |
| **PONTIAC** | | |
| De Luxe Six | | |
| Bus. Coupe, 2d. | 781 | 3140 |
| Sedan, 2d. | 830 | 3225 |
| Sport Coupe, 2d. | 853 | 3150 |
| Tour. Sedan, 2d. | 855 | 3210 |
| Cabriolet, 2d. | 945 | 3220 |
| Sedan, 4d. | 881 | 3235 |
| Tour. Sedan, 4d. | 906 | 3235 |
| De Luxe Eight | | |
| Bus. Coupe, 2d. | 857 | 3270 |
| Sedan, 2d. | 893 | 3330 |
| Sport Coupe, 2d. | 913 | 3275 |
| Tour. Sedan, 2d. | 919 | 3345 |
| Cabriolet, 2d. | 985 | 3345 |
| Sedan, 4d. | 939 | 3380 |
| Tour. Sedan, 4d. | 965 | 3375 |
| **STUDEBAKER** | | |
| Dictator | | |
| Bus. Coupe, 3p. | | |
| Cus. Coupe, 3p. | | |
| Cus. Coupe, 5p. | | |
| Cus. Sedan, 4d. | | |
| Cruis. Sedan, 4d. | | |
| St.Reg.Cu.Sd.,2d | | |
| St.Reg.Cr.Sd.,2d | | |
| President | | |
| Cus. Coupe, 8p. | | |
| Cus. Coupe, 5p. | | |
| Cus. Sedan, 4d. | | |
| Cruis. Sedan, 4d. | | |
| St.Reg.Cu.Sd.,2d | | |
| St.Reg.Cr.Sd.,2d | | |
| State Pres. | | |
| Sedan, Cust. | | |
| Sedan, Cruis. | | |
| Coupe, Cust., 3p. | | |
| Coupe, Cust., 5p. | | |
| **TERRAPLANE** | | |
| 6-71 De Luxe | | |
| Bus. Coupe, 2d. | 750 | 2670 |
| Coupe, 3p, 2d. | 770 | 2715 |
| Brougham, 2d. | 800 | 2830 |
| Tour. Bro., 2d. | 755 | 2830 |
| Vict. Coupe, 2d. | 815 | 2765 |
| Sedan, 4d. | 845 | 2865 |
| Tour. Sedan, 4d. | | 2865 |
| Conv. Coupe, 2d. | 890 | 2765 |
| Conv. Bro., 2d. | 970 | 2870 |
| 6-72 Super. | | |
| Coupe, 3p, 2d. | 850 | 2755 |
| Brougham, 2d. | 880 | 2875 |
| Tour. Bro., 2d. | 835 | 2875 |
| Victoria, 2d. | 890 | 2795 |
| Sedan, 4d. | 920 | 2905 |
| Tour, Sedan, 4d. | | 2905 |
| Conv. Coupe, 2d. | 960 | 2825 |
| Conv. Bro., 2d. | 1040 | 2915 |
| **WILLYS** | | |
| Model 38 | | |
| Economy Coupe. | 499 | |
| Standard Coupe. | 525 | |
| De Luxe Coupe. | 579 | |
| Standard Sedan. | 573 | |
| De Luxe Sedan. | 624 | |
| Custom Sedan | 715 | |

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"DAG" COLLOIDAL GRAPHITE IS A 100% AMERICAN MADE MATERIAL

## *"Safety Through Service"*

T. E. Wisner, service merchandising manager, Chrysler Motors Service Division, is taking an extended trip to confer with Dodge-Plymouth, De Soto-Plymouth, and Chrysler-Plymouth dealers from Kansas City to the West Coast.

Mr. Wisner will survey progress of the 1937 "safety through service" program. This program was developed by T. W. Moss, general service manager, Plymouth, Dodge, De Soto, and Chrysler in November, 1936. Wide acceptance by car owners is responsible for its increasing expansion.

## *Los Angeles Installs Sodium Safety Lights*

Twenty-two highway intersections in the southwestern section of Los Angeles, in the vicinity of the municipal airport, are to be lighted by the city with General Electric sodium safety lights. This is Los Angeles' latest sodium intersectional lighting.

During the early part of 1937 the city installed sodium safety units at nine hazardous intersections on San Fernando road, a state route and principal highway between Los Angeles and San Joaquin valley cities. The highway is also the shortest route to San Francisco, and is used heavily.



## Packard

(*Continued from page 21*)

under each coil spring so as to insulate the entire mechanism from the frame.

Coming to the rear suspension, we find a completely rubber-suspended rear axle and spring mechanism. Rear leaf springs are provided with unpacked metal covers and the leaves are separated by bedded buttons at the tips, three types of buttons being used—rubber, Oilite bearing material, and a special white metal alloy. Completely rubber-floated shackles are used both front and rear to complete the isolation of metal-to-metal contact.

The new springs work in harmony with a number of novel elements. First of these is the lateral stabilizer or radius rod, fixed to the axle at one end and to the frame at the other. This eliminates the tendency to wander or steer at the rear. Then there is the roll control or sway-bar at the rear, ahead of the axle. In addition, Packard has devised a novel shock absorber hook-up which serves as a torque arm. As illustrated, the shock absorber linkage has longer arms than is customary, with the linkage on one side pointed to the rear, and on the other side pointed to the front.

A very interesting feature of the hypoid rear axle which apparently has not received due attention is the use of a novel spacer between the two pinion shaft bearings. Its function is to preload the bearings at assembly. The spacer has an extremely thin section near the larger end and at assembly as the bearings are being preloaded, the thin section begins to buckle so that the amount of pre-loading is substantially independent of the amount of maximum pressure that may be imposed by the nut. Another interesting point is that the pinion shaft end has the Marsden thread which cannot loosen under vibration.

The Senior line consists of two basic chassis models—the Super Eight and the Twelve. The Twelve is available in two chassis lengths—134 and 139 in.—and ten body styles. The Super Eight is available in three wheelbases—127, 134 and 139 in.—and in 11 body styles.

The Twelve engine remains the same and the Super Eight is an L-head, with 3 3/16 in. bore and 5 in. stroke, 320 cu. in. displacement, rated 135 hp. at 3200 r.p.m., with compression ratio of 6.5 to 1. On the Super Eight, the cylinder block has been improved by the use of longer water jackets and the introduction of a circumferential rib-around the upper end of each cylinder barrel. This combination increases the rigidity of the cylinder walls and aids in preventing cylinder distortion.

## *A.A.I. Convention*

Allied Automotive Industries of California, a state-wide trade association for independent repairmen, is holding its seventh annual convention and maintenance show at Oakland, Oct. 29-30-31. The displays will be open to the members of the trade, their employes and the motoring public from 10 a. m. to 11 p. m. each day.

**BE SURE TO SEE THE...**

# New Westinghouse Rectigon BATTERY CHARGER

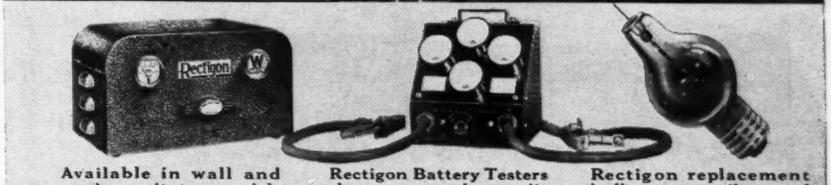
**PAYS FOR ITSELF IN 2 WEEKS**

**WHEN we say that the new Westinghouse Rectigon Battery Charger will pay for itself in two weeks, we are not asking you to stretch your imagination. This statement is based on the prospect-building plan, which goes with the Rectigon charger. Futhermore, the Rectigon charger being newly redesigned, has higher efficiency. Full proof of how the Rectigon charger can pay for itself in 2 weeks is given in the Proof Book, which is now ready for you.**

**We offer you the Free Battery Check-Up Plan and all the necessary materials to identify yourself with your customers as a battery check-up station. In other words, we offer you a plan that merchandises your charging service and locates prospects. These prospects are not only battery charging prospects, but also may later be first-class prospects for replacement batteries.**

**For a limited time, all the necessary publicity material for the battery check-up plan is offered at no charge to Rectigon purchasers. This includes window streamers, outside banners, reminder stickers, and the battery check-up tags.** J 20384


The Reminder of the Westinghouse "Free Battery Check-Up Plan" Locates Battery and Charging Prospects.




**Available in wall and service unit types. Adjustable charging current. Six battery rectigon unit priced as low as $36.00.**

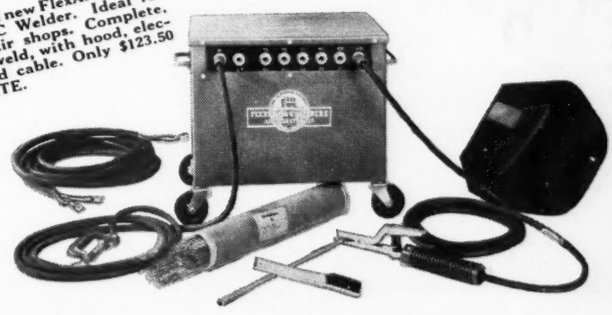
**Rectigon Battery Testers show accurately condition of each cell under true load conditions. Wall and bench models.**

**Rectigon replacement bulbs customarily exceed the guarantee of 1200 hours. Six ampere bulb at a new low price of $6.00.**

Westinghouse Elec. & Mfg. Co.
East Pittsburgh, Pa.

Westinghouse

Sensational new FlexArc Midget Marvel A-C Welder. Ideal for small repair shops. Complete, ready to weld, with hood, electrodes and cable. Only $123.50 COMPLETE.



Westinghouse Elec. & Mfg. Co.
East Pittsburgh, Pa.
Division 7-N

Please send me full information on your:

- ☐ Battery Check-Up Plan.
- ☐ Proof that it "Pays for Itself in 2 Weeks."
- ☐ Midget Marvel Welder.

### *White Side-Wall Paint*

The increase in popularity of white sidewall tires has made U. S. White Wall Rubber Paint one of the most successful products of the United States Rubber Co. Originally introduced to keep white sidewall tires clean and fresh, this self-vulcanizing compound of pure rubber and white pigment has been found to be a satisfactory substitute for white side-wall tires when the customer does not want to pay the extra cost. The paint is applied with a brush without removing the tire, and three coats make a finished, permanent job.

F. K. Bauer

F. K. Bauer, formerly division sales manager at Kansas City, Mo., for the National Battery Company, has been named general sales manager in charge of National Battery sales and the National farmlight division, according to a recent announcement made by Herbert King, vice-president in charge of sales for the National Battery Company.

### *Pikes Peak Busted*

Louis Unser, successor to the late Glen Shultz, established himself as Champion of Pikes Peak climbs on Labor Day, September 6, when he won his third annual victory up 12 miles to the top of the famous mountain.

Despite a snow storm which made the course even more treacherous than usual, Unser came close to the record established in winning the 1934 climb.

He negotiated the winding roadway up 12 miles and 2,200 feet in 16 minutes, 27.04 seconds. His existing record established in 1934 is 16 minutes, 1 second. Last year when he won his second victory in revival of the climb, Unser was clocked at 16 minutes, 28.2 seconds.

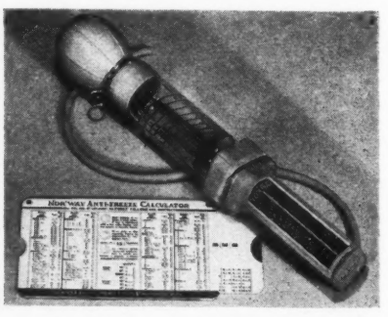
He drove the 32-valve Stutz especially constructed for the climb by the late Glen Shultz, who was master of the Peak until his death three years ago. It is the same car Unser used in 1934 and 1936. No climb was held in 1935 because of controversy over the contract for the highway.

| Pos. | Driver | Car | Time |
|---|---|---|---|
| 1. | Louis Unser | Schultz Spl. | 16:27.4 |
| 2. | Al Rogers | Cragar Spl. | 17:05.4 |
| 3. | Bud Martinson | Cragar Spl. | 17:25.1 |
| 4. | Phil Shafer | Buick Spl. | 17:27.1 |
| 5. | Joe Thorne | Miller Spl. | 17:44.2 |
| 6. | Walt Killinger | Cragar Spl. | 17:45.1 |
| 7. | Russ Snowberger | Miller Spl. | 20:18.1 |



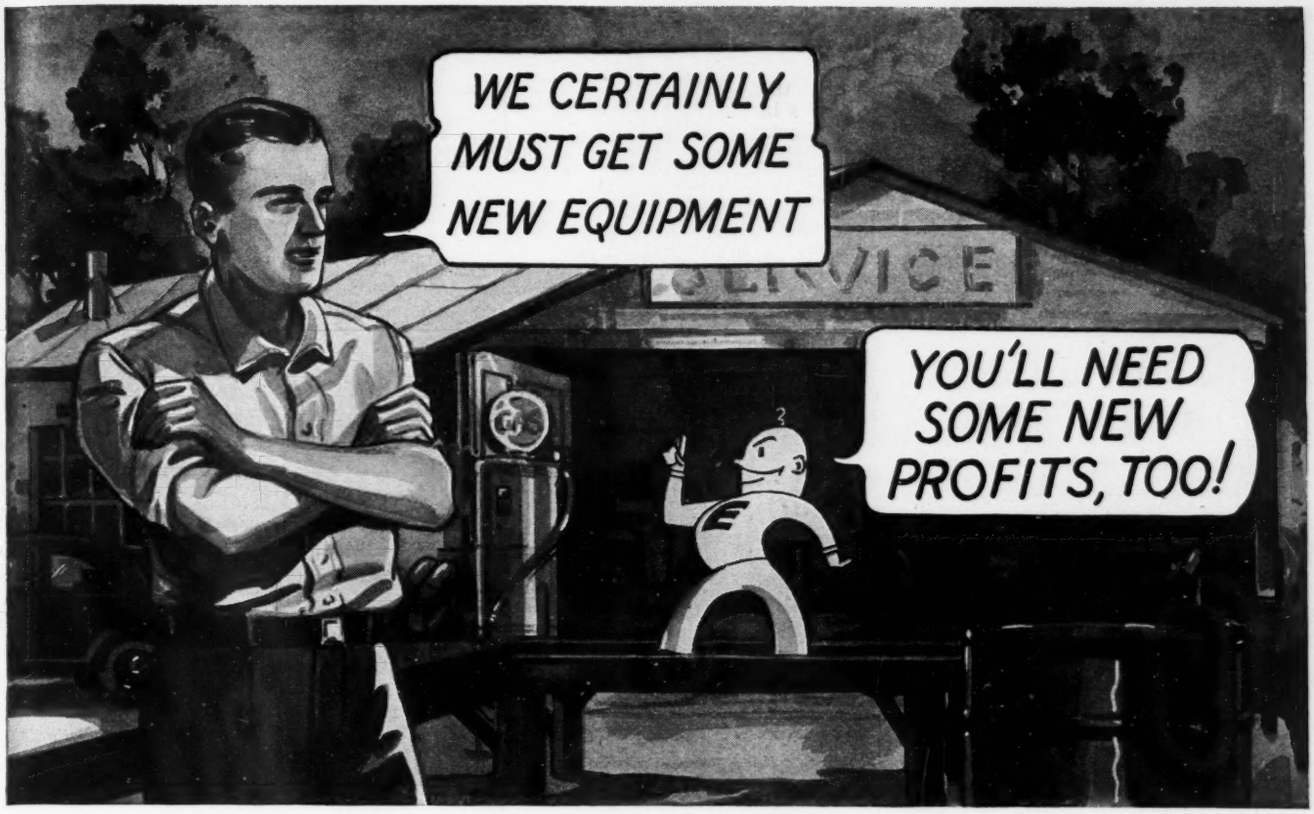
### *Anti-Freeze Tester Has Direct Reading*

Shown in the accompanying illustration is a Nor'way direct-reading tester which is said to be the first direct-reading anti-freeze hydrometer on the market. The temperature of the solution is recorded on a thermometer that runs at right angles to the rise and fall of the float. By lining up the thermometer fluid with the red tip of the float, the degrees protection may be readily read. Another novel feature is that the protection



scale is calibrated in even 10 deg. steps. This enables the service man to make direct comparisons to either a wall chart or to the Nor'way slide rule calculator.

The Nor'way direct-reading tester and calculator can be obtained as a merchandising aid with the purchase of 50 gallons of Nor'way anti-freeze, a product of Commercial Solvents Corp., 230 Park Ave., New York City.




## . . . And you can get those new profits with EDISON

If you're an average dealer, new equipment is just *one* of the ways you'd like to bring your shop up to date. With Edison, you can make the extra profits you'll need to meet these rising costs of doing business.

The Edison Franchise is the most certain and sensible plan ever developed to make more money in the battery business. With the Edison merchandising plan, you're virtually sure of bigger battery profits all year 'round. And now, when the heavy battery season is just beginning—Edison means more to you than ever!

Get in on the Edison profits now! Don't take our word for it: send for full information on the product—full proof of the profits. Thomas A. Edison, Inc., Emark Battery Division, Kearny, N. J.

Thomas A Edison


"Since taking on the Edison line, we have definitely increased our battery business and profits. The Battery Selector has certainly enabled us to sell more of the higher capacity batteries than we were able to previously."

WALTER TRUELOVE
*Sauters Service Station*
Long Island City, N. Y.

# EDISON

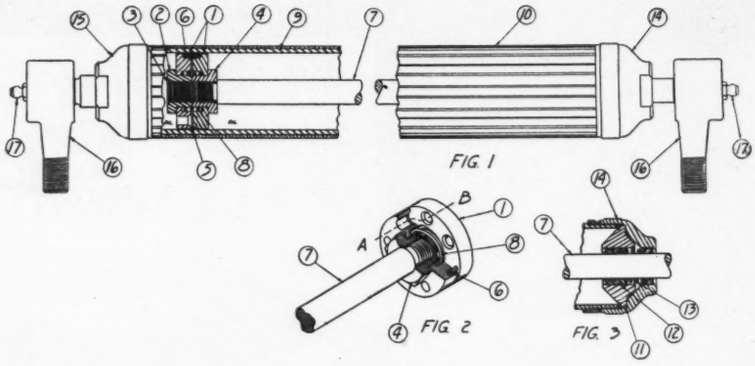
E-mark BATTERIES

### *Steering Stabilizer*
### *New Bendix Device*

Termed as one of the most constructive safety devices in the history of the automotive industry, the Bendix hydraulic steering stabilizer has been announced by the Bendix Products Corp., 401 Bendix Drive, South Bend, Ind.

Similar in general appearance to the new aero-type shock absorbers, the steering stabilizer is attached to some member of the front chassis or front axle, and the outer end of the piston rod is attached to the steering tie rod. The device does not interfere with the normal steering of the car, as its action depends on the sudden action of the tie rod. When the tie rod is moved as little as .010 in. in either direction suddenly, as from a bump or shock, the restriction of the oil passing from one end of the cylinder to the other through ports in the piston is such that it forces the two halves of the piston (1) to come together, completely stopping all flow of oil. The spring (8) forces the piston halves apart, but the rapid succession of shocks repeats the above action many times a second in the case of a blowout and holds the wheels steady in the same position as when the original shock occurred.

During normal steering the tension of the spring (8) is sufficient to keep the two halves of the piston separate so that oil will pass from one end of the cylinder to the other without restriction, so there is no stiffening of the regular steering control.







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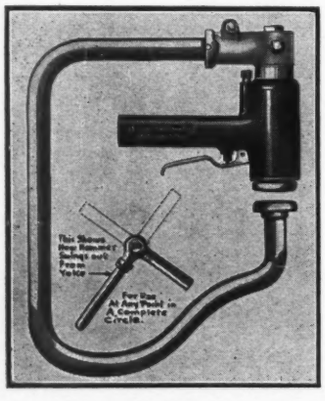
### *Seiden Hammer Has*
### *Flexible Yoke*

The Tomkin-Johnson Co., Jackson, Mich., makers of the Seiden pneumatic hammer, has developed a new hammer complete with four flexible yokes and six hardened and specially shaped anvils. These yokes are flexible, and absorb the vibration. The various shapes in which they are made, plus the fact that the hammer handle swivels out from the yoke to



any point in a complete circle, permit the operator to reach and service any spot in body and fender straightening. The hammer operates on 60 to 90 lbs. of air, and delivers approximately 6000 hard blows or fine vibrations per minute, as desired.


ANY starter has a tough job turning over a high compression motor on a cold day. Don't handicap it with corroded battery cables. Use NEWTYPE NOKRODE, the battery cable unit with the diekast, steel reinforced connector.

NEWTYPE NOKRODE simply cannot corrode. The starter gets full voltage, because the connector is made of the same material as the battery post itself. Try NOKRODE on your own car if you want to learn something. Meanwhile, be sure and get full particulars about NOKRODE, now standard equipment for more than 1 out of every 4 new cars.

**THE OKONITE COMPANY**
**NEWTYPE AUTOMOTIVE DIVISION**
**PASSAIC, NEW JERSEY**

*"Founded 1878—over half a century of service"*

WAREHOUSES • CHICAGO • LOS ANGELES • SAN FRANCISCO • WILKES-BARRE

**NEWTYPE NOKRODE BATTERY CABLE UNITS**

## Hupmobile

(*Continued from page 24*)

of high output is standard equipment, with full voltage control. Willard batteries are used — 15 plate, 105 amp. hr. capacity on the Six; 17 plate, 120 amp. hr. on the Eight. A fuel selector is supplied for adjustments with standard fuels. Pull-knob starter is used in conjunction with a Bendix automatic shift on the starting motor. Champion C-7 spark plugs, 18 mm. with gap of 0.028-0.030 in., are standard.

Coming to the chassis details, we find an improved X-frame for both Six and Eight with extra wide and deep front cross-members on the Eight. Radiator grille and headlamp mounting are integral with the bracing for front fenders, forming a rigid structural arch at the front end, insulated from the frame.

Rear axles remain the same—semi-floating type with standard ratio of 4.54 to 1 and optional ratios of 4.09 and 4.27 to 1. The Sixes continue spiral bevel gearing while the Eights use the hypoid gearing.

Warner gear synchro-silent constant mesh, short-shift transmission with chrome-nickel alloy steel gears, is standard on the entire line. The Super-drive (overdrive) is standard equipment on the Eights. It cuts in automatically at 40 mph.

Hydraulic brakes are standard on all models, with 10 x 2 in. cast iron drums on the Six, and 12 x 2 in. Centrifuse drums on the Eight. Molded brake lining is used throughout. Total braking surface on the Six—166 sq. in., on the Eight—201. sq. in.

A 10-in. single-plate, dry-disk clutch is used on all models. The clutch release bearings is of the life-sealed ball bearing type. Needle bearing universal joints with tubular propeller shaft are used on all models.

### *Campaign Promotes Safety Glass*

The Plate Glass Manufacturers of America, an association comprised of the leading producers in the field, have launched an extensive campaign to focus the motoring public's attention upon the advantages of safety plate glass as all-around equipment in automobiles, as compared with safety glass made of ordinary window glass.

Full-page consumer advertising is being placed in such national magazines as *Saturday Evening Post, Collier's,* and *Life,* backed by frequent insertions in leading automotive trade papers. Manufacturers whose cars are so equipped are co-operating with display advertising in dealer show rooms, and are instructing salesmen to point out that their cars have safety plate glass all around.

Motoring comfort for all passengers, as well as driving comfort for the man at the wheel, is urged in the advertisements. The copy explains that safety plate glass is superior to ordinary safety glass, made of sheet or window glass, because it is ground and polished. This grinding and polishing to precision smoothness removes waviness and distortion and thus helps to eliminate two of the greatest hazards faced by drivers, eyestrain and fatigue.

## Super-Super Service

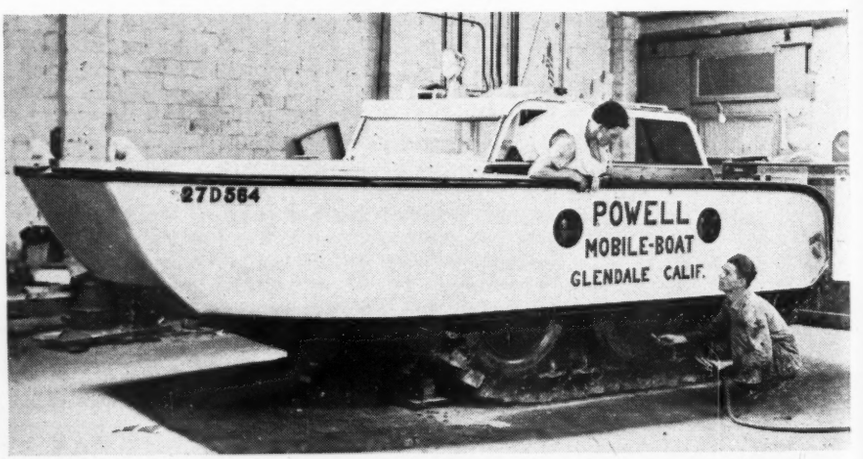
(*Continued from page 29*)

are large wall boards containing radios of different prices all connected up so they can be tried out instantly by prospective buyers. One of these boards is in the accessory shop, and another in the radio repair shop.

Muller Bros. believe in advertising. They have two outside men constantly soliciting new business with credit cards. They also use radio, billboards and newspapers as mediums through which they "tell the world" about their service. Over 1000 cars a day drive into the lot for some service, even though Sunset Blvd. is lined with several other fine super service stations.

The Muller brothers are congenial men with pleasing personalities, who like to meet as many of their customers as possible. Employes are selected for the same pleasing manner plus experience in their particular departments.

Muller Bros. is the largest service station in the world, but the owners like to speak of it as "The greatest service station in the world . . . one that covers a multitude of sins for car owners."




**It Floats** **This mobile boat, designed at Glendale, Calif., is 99 44/100 per cent perfect, its builders claim. Moves on land or sea and the next step is to construct a floating trailer.**

# ONE OUT OF THREE will Crack Up

Model S-100 Porto-Power, complete with 52 attachments — the right set-up for handsome profits fixing crack-ups. Dealer price $195.75. (Slightly higher on West Coast and in Canada.)

Patents applied for

## Get the Crash Profits with a Porto-Power in your shop

THINK of it! One out of every three cars on the road today is slated for a crack-up — all the way from bashed-in fenders to a wreck that needs a complete going-over.

With Porto-Power in your shop you get your share of cracked-up cars — and earn plenty of extra profit. Porto-Power has everything you need for every job. Its tremendous hydraulic power does everything from smoothing out minor dents to untangling major wrecks. Porto-Power salvages damaged bodies and frames, and handles the entire rebuilding job faster and better than cumbersome, expensive equipment formerly used. In short, Porto-Power is today's answer to body rebuilding, frame and axle straightening and general shop jobs.

Ask your jobber salesman to demonstrate Porto-Power — and explain his Time Purchase Plans. Write us for Free book "Quick Set-ups for Crash Profits."

BLACKHAWK MFG. COMPANY
Dept. MA-10 Milwaukee, Wisconsin

*Exclusive Canadian Distributor*
THE CANADIAN FAIRBANKS-MORSE CO., LTD.
*Branches in all Principal Cities*

## Studebaker

*(Continued from page 23)*

proved, engine rating remains the same—90 hp. at 3400 r.p.m. with 6.0 to 1 compression ratio. Cast iron heads will be used on both Six and Eight.

Cam-ground Lynite pistons, tin-plated, will be used on both engines. Ring arrangement same as before with three rings above the piston pins —two ⅛ in. compression rings; one 3/16 in. oil ring.

Spun-in babbitt bearing construction is used for the President connecting rod big end. On Sixes they use steel-backed babbitt-lined interchangeable precision bearings.

Spark plugs are Champion No. 8A, 18 mm. with gap setting 0.0225 to 0.0275 in. Spark control full automatic with vacuum advance. Six cylinder cars have Auto-Lite high-capacity generator with third brush and vibrator voltage regulator. The President has Delco-Remy generator with full automatic current and voltage regulation, output being 26 amp. constant. All models have 15-plate Willard batteries rated 105 amp. hr. capacity.

Sixes have the Thompson-Products rubber insulated propeller shaft which has been improved by reducing weight at the joints for better balance. The President is fitted with Spicer needle bearing joints.

With the change in car weights this year, corresponding changes have been made in the hydraulic brake system. Composite brake drums are continued. On the Six, the drum is 11 x 2 in., an increase of ¼ in. in width; on the President, the drum is 11 by 2¼ in. (12⅛ x 1¾ in. last year). Woven lining used in the front shoe, molded on the rear. Effective braking area—150 sq. in. on the Sixes, 169 sq. in. on the President.

The Planar front suspension has been simplified and improved. The front spring center section now is constrained instead of freely pivoted. With the adoption of independent springing as standard, Studebaker has further improved steering geometry. As will be noted in the illustration, the new arrangement employs a transfer link on the right hand side so that the linkage is approximately symmetrical on both sides with two tie-rods of practically the same length. In addition, the center of the tie-rod pivot points on each side is aligned with the axis of the axle lower arm pivots so as to produce better steering geometry under all conditions and with flexing axle. Ross cam and twin lever steering gear is standard on all models with steering ratio of 15 to 1, minimum.

As shown in the drawing reproduced here, the optional vacuum-shifting device is in reality a combination of a positive mechanical shift with a vacuum power cylinder assist which provides power for shifting. The hand lever operates the mechanical linkage for shifting as well as the Bowden wire control for the cross-over shift. The linkage operates the vacuum cylinder control valve so as to get a follow-through movement of the cylinder, aiding in power shifting. The unique feature of the device is that the operator gets the same "feel" through the gear shift ball as with the conventional shifting lever and in an emergency—due to extremely cold weather when the resistance may become abnormal or when the vacuum pressure depreciates—it is possible to complete the shift without assist by applying extra pressure on the long lever.

New bodies are wider and roomier and of all-steel construction. The front seat is 55½ in. in width; rear seat hip room is 47¼ in. There is a one-piece hood with no side louvers.



## *Trailer Rental Plan For National Parks*

Visitors to national parks will be able to make a trailer trip through the parks this season. Under a new rental plan, trailers will be available at Yellowstone, Grand Tetons and Glacier National Parks. Tourists will be able to drive in their own cars to the parks, stop at terminals, have trailer couplings installed on their cars and rent trailers to live in while following park trails. All that will be necessary for them to do will be to buy groceries. Trailers will be equipped with linen, towels, bedding, dishware, table silver and utensils, Hayden said.

## Plymouth Transmission

(*Continued from page 27*)

When assembling the countershaft gear set, it is important that the steel thrust washer (1, Fig. 6) be placed next to the bearing rollers and the bronze washer (2, Fig. 6) next to the transmission case at each end of the shaft.

1—Install the reverse idler gear and shaft.

2—Install the countershaft bearing spacer in the countershaft gear, together with the countershaft gear installing arbor.

3—Insert the bearing rollers in the forward end of the countershaft gear. The end of the gear should be packed with a high grade medium cup grease, to hold the rollers in place. Place the countershaft gear and thrust washers in position after they have been coated with cup grease.

4—Holding the plate and the washer in position, turn the gear over and stand it on its forward end. Insert the bearing rollers in the rear, holding them in position with cup grease. Place the thrust plate and washer in position. The countershaft gear assembly is now ready for installation in the case.

5—With the transmission case on a bench, place the countershaft gear assembly into the bottom of the case and install the transmission drive pinion.

6—After installation of the transmission drive pinion assembly, lift up on the countershaft gear set and insert the countershaft from the rear end of the case, driving it into position with a lead or rawhide mallet, at the same time forcing the countershaft installing arbor out of the case.

Check the end-play by prying the countershaft gears toward the front end, inserting a feeler gage between the thrust washer and the case in the rear. This end-play should be a minimum of 0.002 in. to 0.008 in. maximum. Thrust washers are available in three different thicknesses, marked "A," "B," and "C," the letter "A" indicating the thinnest washer. Proper end-play can easily be obtained by the use of these washers in combinations of different thicknesses.

7—After installing the countershaft gear, the reverse idler gear and countershaft gear lock plate should be secured.

8—The mainshaft assembly, with all gears in position, can follow.

After completing the assembly operations as indicated, the first and reverse sliding gears and the sliding clutch sleeve should be placed in neutral position and the transmission shifter rails installed.

The high and second speed gear is held on the mainshaft by means of a locking washer. This locking washer is made with splined slots in the hole, which permits sliding it on the mainshaft. A groove is cut in the mainshaft at the side of the mainshaft second speed gear, so that when the locking washer is in this groove, it can be rotated sufficiently for the splined slots in the washer to register with the space between the splines on the mainshaft. This prevents the locking washer from moving away from the gear. A hole is drilled in the mainshaft in the bottom of the locking washer groove, and in this hole is a spring and plunger. The spring forces the plunger into the splined slots in the locking washer, which in turn prevents rotation of this part.



### *Driving Guide*

The Lantz Phelps Corp., 420 Linden Ave., Dayton, Ohio, presents the LP Drive Guide, an accurate scientific instrument for passenger or commercial cars for checking wasteful driving habits and faulty motor conditions.


The photograph illustrates the dial of the Drive Guide. The "T" coupling connects to the vacuum line of the car, and the instrument clamps to the steering column. On the face of the dial, the upper arm of the indicator shows the motorist when he is getting the greatest driving economy per gallon of gas; the lower instrument hand indicates the general condition of the motor.

### *Thompson Promotions*

Promotions and territorial changes affecting thirteen men in the replacement sales organization of Thompson Products, Inc., Cleveland, have been announced by Tom O. Duggan, general manager of the company's service division.

Charles A. Cole, formerly Detroit district manager, has been promoted to the position of western division sales manager, in charge of states west of the Mississippi, under E. T. Syvertsen, general sales manager. Phil Sommerlad, Chicago district manager, was similarly advanced to eastern division sales manager.

Len W. Reeves has been promoted from southeastern district manager in Atlanta, Ga., to the original equipment division as sales engineer. His former territory is now divided between Robert L. Thompson, promoted to district manager, who continues his work out of Atlanta, and Robert B. Wick, a new district manager, in Memphis. Wick has been at the Cleveland plant of Thompson Products for two years.

Stanley P. Bayless, formerly district manager in the Pacific southwest, was advanced to manager of the service division of Jadson Motor Products Company, Bell, Calif., a Thompson subsidiary.

Knute B. Swennes, previously engaged in general field work, was made district manager in Nebraska, Colorado and Wyoming, with headquarters in Omaha. G. R. Moore, formerly in charge of this territory, has been transferred to St. Louis. He takes the place of Steve J. Hall, assigned to New York City. Howard E. Rowen moves from the Wisconsin, Illinois, Iowa territory to Chicago, to fill the post vacated by the promotion of Sommerlad. Ray Swarner moves from Kansas City to Los Angeles, replacing Bayless. Al Vinton, previously district manager in New York City, goes to Kansas City.

Two more promotions to district managerships were also announced. They went to Ray Shrider, who has been doing general field work and now takes over Rowen's old territory in Wisconsin, Illinois and Iowa, and to L. R. Shaffer. Shaffer has charge of Cole's former territory, working out of Detroit. He has been in the home offices of the Thompson service division for eight years.

In his announcement Duggan pointed out that all promotions were in line with the company's policy of advancing men from within its own organization.

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**Williams Catalog**

A new catalog of "Tools of Industry" has been issued by J. H. Williams & Co., 75 Spring St., New York City, makers of quality wrenches. While the catalog lists tools for various industries, it covers a large number of tools used in the automotive field. A free copy will be sent to dealers requesting it on their letterhead, to the manufacturer.



## Willys

(*Continued from page 47*)

a change in the low and intermediate transmission gear ratios, adding to flexibility and power on heavy grades, and changes in the brakes, reducing the amount of effort necessary to apply the brakes.

Changes have been made in the instrument panel, which still includes airplane-type instruments and two glove compartments, by installing the engine heat indicator separately from the other instruments.

An attractive selection of colors in the DeLuxe and Coupe models is offered in the passenger car line.

Interior trim features attractive upholstery, and a noteworthy use of upholstery panels in the doors that set into a metal frame, preventing dirt and scuffing.

Although prices of the 1938 models have not been announced, it is understood that the new Willys cars will continue to occupy the lowest price position among America's full-sized automobiles.

The new commercial unit which has been anticipated by the trade for several months also makes its appearance as the lowest cost unit of its type now available.

Tire sizes on passenger cars remain 16 x 5.50, affording a tire of generous over-size for all requirements.

Production of the new Willys for the 1937 sales period totalled 63,465 units. Planned production for the 1938 sales period calls for in excess of 120,000 units, including commercial and passenger cars.

### *D. Kirk Moore Joins Budd Sales Force*

D. Kirk Moore, long asosciated with the automobile parts industry, has joined the Edward G. Budd Manufactu.ing Company and will handle special sales work. He will be attached to the Detroit Division with headquarters at Detroit. Prior to his Budd connection, Mr. Moore was associated with the Borg-Warner Corp., handling special developments at its Detroit Gear and Machine Division. For many years prior he was vice-president in charge of sales of the Bendix Aviation Corporation.

### *Sloan Forecasts Further Price Increases*

There will be increased prices for automobiles when the 1938 models are introduced, Alfred P. Sloan, Jr., chairman of the board, General Motors Corp., said Aug. 29, when he returned from a vacation and business trip in Europe.

"Prices had to go up and they will probably go further, in some cases, before the introduction of the new models. Higher material and labor costs have forced the prices up. As remarkable as they have been, the economies of improved production methods and techniques have not been able to offset the increases in wages and material prices."

"I don't expect any radical changes in the 1938 models," Mr. Sloan said. He thought there would be numerous refinements, and a decided increase in automatic shift transmissions and the overdrive.

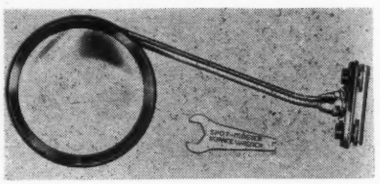
It will be "very many years" before Diesel engines will be used in passenger cars to any extent, Mr. Sloan said, although General Motors is building Diesel engines for marine use in its Winton engine plant in Cleveland, and for trains and other industrial uses in its Electro-Motive plant at La Grange, Ill. Recently the corporation began a new building in Detroit to build trucks for Diesel powerplants.

"Very good" was Mr. Sloan's opinion of the overseas business of the corporation. More cars could be sold in Germany and England, and probably in other European countries, if the difficulties in getting materials and parts were not so great.



### *Panoramic Mirror Attaches To Door*

One of the latest products of The Anderson Co., 957 Garfield St., Gary, Ind., is their new "Hermetic" rear view mirror. An outstanding feature of construction is that the glass is cemented into a copper shell in such a way that the back of the mirror becomes permanently sealed within a partial vacuum. Since air and moisture cannot attack the back of the



glass, the manufacturer places an unqualified two-year guarantee on Spot-Master DeLuxe. The mirror is also panoramic, in that the glass is curved to provide a wide range view of the full width of the road behind. Although only 3 in. in diameter, its panoramic principle permits a view equal to a 5½ in. diameter flat mirror. List price, $1.85.

### *Body Metal Cutter Speeds Repair Job*

A new cutting tool for sheet metal work has been developed by Ralph W. Poe, 306 West Locust St., Canton, Ill. The tool is designed to be used with a hammer, and has a sharp hooked


point to penetrate the metal and start the cut. Then the tool is struck with a hammer on the point provided, and a clean cut is made, either straight or circular. Ideal for cutting out sections of a damaged panel without damaging the adjacent parts. Will handle all sheet metal up to 16 gage. List price $2.50.

MOTOR AGE

October 1907

## 30 Years Ago

**NEW YORK AUTO SHOW 1907**

A great deal of attention has been paid to the brake proposition, and an increase of braking surface is shown on the majority of exhibits; in fact one man expressed his opinion that he had brakes enough to burn up his tires in a day's run. Of course this was only intended to show what the spectacular driver who delights in prompt stops could do, and not for general practice. No doubt this increase of braking surface was brought about by the recent Glidden tour, when so any had troubles of this sort. On the Cleveland the brakes are 16 inches by 3¼ inches wide. It has double brakes on each rear wheel and figures about 600 square inches of braking surface. This is one of the largest noticed although the majority of cars is equally well equipped. The practice tends toward double brakes on the rear wheels, some cars having two flanges with two expanding brakes others having one flange with a contracting band on the outside and an expanding band within. There is only one exception to the expanding and contracting brakes and this is found on the Great Smith car which sticks to the male and female cone brakes. The practice of having the brakes on the propeller shaft is not general. No water-cooled brakes are shown, but on one rear axle exhibited the brake flange has radiating flanges around it, to permit cooling by air. The practice of interconnecting brake and clutch is still popular, although some cars have this interconnection with the emergency brake. Metal-to-metal brakes and leather covered brakes are used very generally, but camel's hair belting seems to be a favorite for friction material. The Standard Brake Co. shows a metal-to-metal brake with cork inserts, the cork being about one-third the friction surface. This brake is said to be very effective and yet not harsh.

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An entirely new style of tire has been brought out by the Swinehart Clincher Tire and Rubber Co. of Akron. This is a celular tire for heavy touring cars. It is made of solid rubber, nearly square in cross section, with flat tread, and is molded with many large holes extending downward nearly to the base. Instead of being radial these holes are tangent to the center of the wheel, so as the tire rolls on the road the compression of the rubber closes the ends of the holes.

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The Victor hydraulic shock absorber has a straight up and down motion instead of rotary, and consists of a cylinder to be attached to the springs. In this cylinder is a piston, which through a piston is fastened to the frame of the car. Each end of the cylinder is connected by a by-pass in which an adjustable screw regulates the flow of liquid from one end to the other. This adjustment is for weight. In the cylinder is a double tapered groove, the widest part of which is against the piston when it is in a neutral position. This allows an easy flow of liquid to pass the piston at normal work, but the longer the stroke the smaller the groove which prevents a severe compression or recoil of the springs.

## Thompson Trophy

(*Continued from page 31*)

Kling insists that he has no trick methods for selling service. "Shucks," said Kling, "when you show a man (or woman) just what is needed and explain that neglect will make the work more expensive, and may cause a break down on the road they just naturally buy."

With Kling's persuasive smile, they probably do. It seems that Kling just can't help smiling. Maybe he likes his work, or maybe the $13,500 prize money has made it easier to smile, but he's been smiling in his garage work for 10 years, now.

Of course Kling has two "salesmen" out front—his gasoline pumps, which because they are easy to drive up to make plenty of contacts for him.

"Our pumps are a regular sales department," says Kling. "The profit from the gas and oil is worth while but what is more important is the opportunity of meeting motorists, getting to know them, and being able to suggest any services that they might need but which need they had not yet discovered for themselves."

And it is this attention at the pump which does much to keep Kling's two mechanics busy. Kling makes a special effort to meet customer's personally. They seem to like it, if attracting trade from 30 miles away is any indication.

But there is more than mere personality here. Kling is death on "Patchwork repairing."

"Do it right or let the other fellow have the job—and the grief that is sure to follow," is Kling's way of explaining how he handles service sales.

And the plane?

Well, Kling has been flying for 7 years. "Just picked it up here and there," he explains. And last winter got the idea that he could build a ship just a little faster than that the other fellow had. It is now a matter of record that he did.

And the future?

Rudy's heart and soul is in flying. There's no doubt of that. But Rudy has an eye for business, too, for he says, "My garage made this possible. It has provided a good living for me and my family and paid for the plane. And now I can spruce up a bit, get some more equipment, and then I'll have a *real* garage. Prize money is plenty sweet but garage profits are more sure."

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## Let Your Equipment

(*Continued from page 32*)

pects of the tremendous changes in motor car construction during the past five years," explains Mr. Spears, "and point out that equipment must be installed in keeping with the changes in cars. Equipment designed to service the automobile built in 1930 won't adequately service the car built in 1936; and we stress this point."

A feature of the Spears Garage is its service on automotive equipment. This specific department is "high-lighted" inside the shop not only by concentration of the equipment but by a special inside awning, colorful and attractive, hanging from the wall above and extending out over the department. A spotlight on the awning not only makes the department stand out in view of customers inside the shop but it is easily seen even by drivers along the street in front of the shop. Thus, the department not only adds vitally to the efficiency of the garage but it serves constantly as a magnet to draw car owners into the shop and then to sell them on the ability of the organization to serve them adequately.

The garage features its "38-Point Motor Check-up" and uses that service to boost "free service" patrons into profit customers. This department is segregated along the wall, with a spot light on it and a sign on the wall to stress the service.

The service is suggested to every person who drives into the garage, regardless of the purpose of his call. Mr. Spears meets all customers himself and does the suggestive selling.

The 38 points covered in this check-up are listed on the wall; and when he induces a customer to have his car checked in accordance with the list, the mechanic starts his check.

Mr. Spears explains to the owner exactly what the check has revealed, explaining it to him by asking him to watch the check and then suggests the needed service. If the customer does not want to have the work done, the check stops there. Mr. Spears explains that there is no value to the car owner or to the garage to go on with the tests if the owner does not intend to anything about the trouble revealed.

If he orders the repair, then the checking proceeds. As each test reveals something needed, Mr. Spears shows the test to the owner and tells him what should be done; and so on until all 38 points have been covered in a scientific manner.

By this method the shop turns many free battery inspections into jobs running all the way from spark-plug cleaning to complete motor overhauls.

"We might merely check a man's car over and tell him he needs a certain job and he probably wouldn't be convinced or even impressed," Mr. Spears points out, "but when we test each item scientifically, right before his eyes, and then tell him that he needs a major job on the car, he cannot help believing us. Although silent, this equipment is by far the most powerful sales argument we can use."

Mechanics work on salary and are not expected to do much of the selling job, because Mr. Spears is on hand to take care of that. However, the owners do offer mechanics bonuses now and then for selling appliances which are being pushed at the time; and this bonus plan adds materially to the sale of accessories in season.

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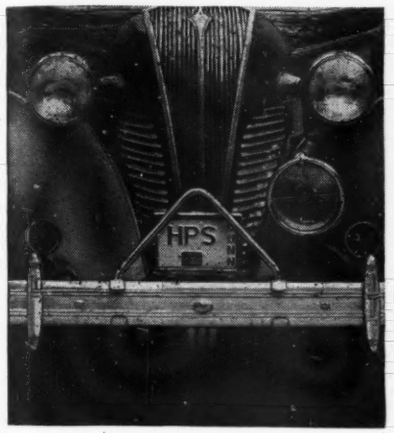
**Represents Lubrication Corp.**

Charles Meisenger, with headquarters at 122 East 42nd Street, New York City, has been appointed eastern representative of The Lubrication Corporation, Chicago, originators of the Standix Cartridge Lubrication System, and manufacturers of hypoid gear dispensers, vacuum cleaners and other automotive service equipment.

### *Grilgard Protects Radiator Grille*

A new grille guard has been announced by the Connecticut Telephone & Electric Corp., Meriden, Conn. Made in standard and deluxe models, the guard is constructed of high tensile strength steel bars, heavily chrome plated. It clamps to the front bumper,




and can be installed in five minutes, according to the manufacturer. Both the standard and deluxe models are made of ⅝ in. and ¾ in. stock, providing a standard and heavy duty guard. The standard Grilgard carries a list price of $2.00, and the DeLuxe Grilgard has a list of $2.30.

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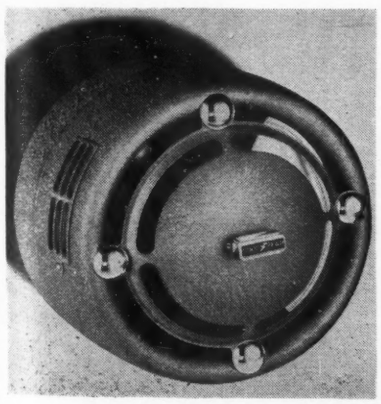
### *Goodyear's Line Of 1938 Heaters*

A line of hot water heaters for 1938, including three new models, has been announced by the Goodyear Tire & Rubber Co., Akron, Ohio. The line consists of the "Double Eagle," the "All-Weather," and the "Comfort." Illustration is of the "All-Weather" model. Incorporated in this model, as well as in the "Double Eagle" model, are new features that are outstanding. A new defrosting feature is built into the heater, operates automatically without the use of an extra motor. Two new foot warmers, one for the driver and one for the front seat passenger, provide a degree of comfort never before achieved. A new principle of heat distribution provides twice the amount of cubic feet of heated air per minute over that of the conventional heater.



### *New Permatex Wax*

A smooth, glossy, water-resisting Wax Polish is being marketed at this time by Permatex Co., Inc., Sheepshead Bay, N. Y.

Cans contain 2½ oz., retail for 30


cents, and are packed in cartons holding one dozen cans including the display as illustrated.

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### *Covered Wagon Advances Silbar*

Appointment of Robert G. Silbar as advertising manager of Covered Wagon Co., Mt. Clemens, Mich., trailer coach manufacturers, has been announced by James L. Brown, vice-president in charge of sales. Silbar formerly was assistant advertising manager, in charge of publicity.

Prior to joining Covered Wagon Company early this year, Silbar was director of publicity for Klau-Van Pietersom-Dunlap Associates, Inc., Milwaukee, Wisconsin advertising agency. He is a former Michigan newspaperman and has contributed widely to magazines and trade publications. In his new position he will have charge of advertsing, publicity and sales promotion for Covered Wagon Company.

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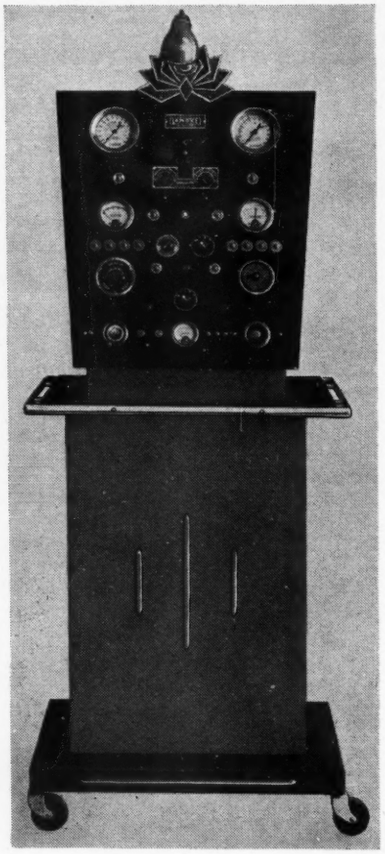
### *Master Motor Analyzer*

One of the latest products of Lanagan & Hoke, Inc., 1638 W. Hunting Park Ave., Philadelphia, Pa., is their



Model 110 Master Motor Analyzer. It is the most complete instrument in this company's line of testing equipment, and is easily portable for convenient use. Makes all tests of ignition, carburetion and compression without removing units from the car. Easy to operate and sold with one year unconditional guarantee. Net price $295.00.

---

### *National Battery Co. Opens New Branch*

The National Battery Company has opened a new factory branch at 170 Russ Street, San Francisco, California, with Mr. M. H. Harvin in charge.

The new building was planned expressly to accommodate the increased volume of business formerly handled by their branch office at Oakland.

### *Imperial Has Tube Bender*

A new hand tube bender, designed for the rapid bending of copper tubing without flattening or crimping has been announced by the Imperial Brass Mfg. Co., 1200 West Harrison Street, Chicago, Ill. Known as No. 364-F, the bender is made in various sizes to take tubing from ⅛ in. o. d. to ⅜ in. o. d.


It can be used at the end or at any part of the tubing, and is calibrated to show degree positions so that it is an easy matter to make duplicate bends at any desired angle Prices range from $2.60 to $3.75.

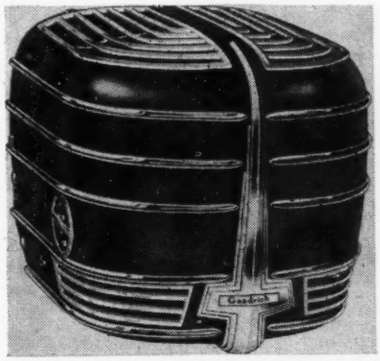
### *Tension Indicating Wrench*

The necessity of even tightening of cylinder head studs has lead to the development of a wrench with a scale incorporated to show the tension applied when tightening the nut. This new wrench is a product of the Storm Mfg. Co., Inc., 406 Sixth Ave. South, Minneapolis, Minn. It is built with a

longer socket head shank for greater convenience in tightening stud nuts on overhead valve motors and to reach the back stud nuts on Chevrolet. The dial is set back 3¾ inches from the center of the socket, and the wrench is 18⅝ inches overall. List price $17.50.

### *Goodrich Announces New Heaters*

A new Super DeLuxe heater, employing a new down-draft principle which throws heat in four directions, will head the line of passenger car hot water heaters announced by The B. F. Goodrich Co., of Akron, Ohio. The complete line comprises three passenger car heaters and a recently in-



troduced heater for buses. The Super DeLuxe heater, according to the Goodrich company, is designed to throw heat four ways—to the floorboard, to the driver's feet, out the front to all parts of the car, and to the windshield for defroster attachments.

*for*

## INSIDE STUFF

Your shop needs at least one good inside micrometer for those close measurements in cylinder bores and bushings or for setting calipers and checking internal or linear measurements. Your tool dealer will recommend the Starrett No. 124. It takes care of a wide range of lengths or diameters by means of interchangeable anvils. It has hardened contact points and a simple adjustment that compensates for wear. Sizes from 2 to 8 inches up to 2 to 32 inches.

The new Starrett Automotive Handbook G describes this and many other Starrett Tools for auto repair and overhaul work. It has a whole section devoted to tried and tested ways to save time and trouble on reconditioning jobs. Write for a free copy.

**THE L. S. STARRETT CO.**

*World's Greatest Toolmakers*
*Manufacturers of Hacksaws Unexcelled*
*Steel Tapes—Standard for Accuracy*
*Dial Indicators for Every Requirement*

**ATHOL, MASS., U. S. A.**

# Use Starrett Tools

### *New License Plate Holder*

The Harlet C. Loney Co., 16517 Wisconsin Ave., Detroit, Mich., is placing on the market a new L & H Deluxe license plate holder which is available with a glass front, brass frame, heavily chrome plated. Rubber gaskets keep out dust and moisture and makes it impossible for plates to


rattle. Manufactured with a strong, durable reinforced metal back which is attached to the number plate bracket. Patented locking device makes the holder a solid complete unit. Made for all size plates including the new 1938 series.

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### *Raybestos Molded Lining*

A de luxe molded lining identified with the gold edge for universal application on internal passenger car brakes. Its flexibility allows easy application on shoes, its atomized lead content is claimed to prevent drum scoring and its asbestos cloth back insures secure riveting.

Attractively finished with blue back, stenciled in gold, each roll bound with steel band to allow lining to be cut from inside of roll—wrapped in crepe paper with blue and orange label with ripcord inserted to facilitate removal of wrapping. The three 25-ft. roll assortment of popular sizes is shipped in a carton which can be easily altered for display purposes as illustrated. These three rolls of PG Molded will service over 473 car models. Write to Raybestos Division, Raybestos-Manhattan, Inc., Bridgeport, Conn.


## Handy BATTERY CHARGERS

LOWER OPERATING COST MEANS MORE PROFIT FOR YOU. No. 6-B Wall type. 6 Battery size. Price, without bulb ..... **$24**

WRITE for Bulletins on complete line of "HANDY" chargers, testers and racks.

BALDOR ELECTRIC CO.
*(Electrical Mfrs. for 17 years)*
4375 Duncan Ave., St. Louis, Mo.
**GUARANTEED for 2 YEARS**

## TRUCUT TAILSTOCK REST

FOR machining armatures in lathes. Holds centerless armatures steady without holders or bushings; positively eliminates inaccurate centers. Adjustable by turn of wrist to take shafts from ¼ to 1" diameter. Guaranteed. Order today or write for Bulletin 102.

Also mfrs. of TRUCUT Commutator Lathe and Mica Undercutter. Complete details on request.

**FRANK N. WOOD CO.**
**WAUWATOSA, WIS.**

**Be sure it's a**

**Genuine**

**PUROLATOR**

## HACKETT Universal ROLLER


**NOW IN BIG DEMAND**

New Type Universal Blade, fits all arms. Blade rolls in action, no bending of rubbers. 7-ply wiping features give 100% wiping, therefore, clear vision at all times.

HACKETT AUTOMOTIVE ACCESSORIES CORP.
Providence, R. I. U. S. A.

Mfrs. of Wiper Arms, Dual Wiper Attachments, Inside Wipers, License Plate Frames, Cigar Lighters, Magnetic Trouble Lights, Shimmy Stops, Parking and Fender Guides, etc.

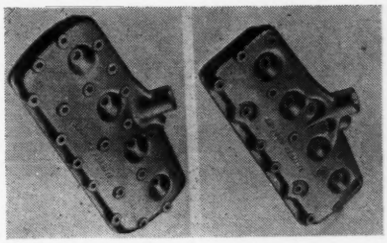
**50¢** *is the*

**NEW LIST PRICE**
*on the* **KREGER**
**No. 203 OIL GAUGE LINE**
**for Chevrolet**

50% Discount on Initial Order if You Mention Jobber's Name.
L. F. KREGER MFG. CO. CHICAGO, ILL.

### *Permite Cylinder Heads For 1937 Ford Cars*

To complete its line of aluminum heads for all Ford models from 1932 to the present, the Aluminum Industries, Inc., 2416 Beekman St., Cincinnati, Ohio, has recently announced the addition of new Permite Aluminum Alloy Heads for both the 60 hp. and 85 hp. model 1937 Ford V-8 engines. These heads are cast in a



semi-permanent mold, according to the manufacturer, which assures a head casting of uniform section and higher quality. Uniform thickness of the wall section tends to eliminate "hot spots," and the smooth surface of the combustion chamber is gained through the use of machined steel inserts instead of sand cores.

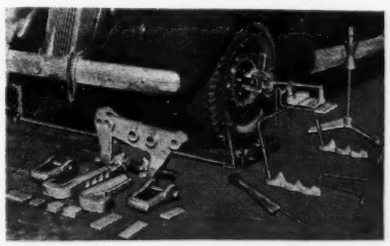
### *Laminated Shim Advances Seipt*

Laminated Shim Company, Inc., Long Island City, New York, manufacturers of Laminum precision adjustment shims, announces the appointment of Richard Seipt as sales manager, effective immediately.

Mr. Seipt has been associated with the Sales Department of the Laminated Shim Company, Inc., for the past two years. Previously he was connected with John Wood Manufacturing Company as a sales engineer.

### *Portable Front End Equipment Announced*

The Manbee Equipment Co., Inc., 44 N. Washtenaw Ave., Chicago, Ill., has announced a new brake tester and steering analyzer, including axle straightening equipment and a wheel balancing stand, that can be used without the necessity of installing a



drive-on rack. The portable feature of this equipment makes it particularly advantageous in small shops where space is limited. The analyzation of front end troubles forms a major part of present-day shop work, and this equipment provides quick and accurate readings with a minimum of effort. Price complete, $321.00; each unit may be purchased separately if desired.

## *Killed in Action*

Thousands in San Antonio, Tex., have grinned through their tears (if any) as they gazed upon a monument whose epitaph recorded a tragedy not uncommon in motoring circles. Standing in front of a service station at Avenue E and Fourth Street, it says:


"In Memory of a Good Motor Killed by Using Cheap Gas & Oil. May It Rest in Pieces. Born 1923, Died 1925."

It attracted so much attention that a San Antonio newspaper arranged a ceremony wherein, while its cameraman was handy, a pretty young lady placed a bouquet "in loving remembrance."

Origin of the monument is a bit vague, but it seems that a discarded old Ford motor once rested beside it. J. L. Champion, present proprietor of the service station, credits the idea to C. E. Ellis, his predecessor at the location. Champion still cashes in on the advertising stunt, a tin-covered wood frame lettered with black ink.

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## *Air-Strainer Cleaner*


A device for pressure-cleaning the carburetor air cleaner has been introduced by the Hawley Mfg. Co., Inc., 555 Dupont St., Roxborough, Philadelphia, Pa. It consists of a tank, into which the air cleaner is placed. A cleaning solution, usually kerosene, is added, and air pressure applied. The turbulence created forces the cleaning solution through all of the small meshes of the filter, removing all foreign matter and abrasives. The time required is very brief, and the air cleaner is thoroughly cleaned, ready for oiling and reinstalling on the car. Sales of the Master Air-Strainer Cleaner are handled through jobbers; dealer cost, $19.75.

### *Bendix Springs*

The Eclipse Machine Co., Elmira, N. Y., manufacturers of the Bendix Starter Drive, has announced a new merchandising program of interest to the automotive replacement trade in general. Each genuine Bendix Drive Replacement Spring is now offered in


an individual blue and white carton which has real display value. This new plan simplifies stocking and handling, and gives added protection against substituting unauthorized parts.

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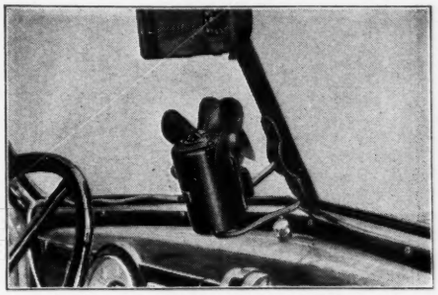
**Another argument for the steel top! This is what a hail storm did to the top of a car in Birmingham, Ala. The stones were the size of golf balls.**

### *Twin Action Defrosting Fan*

A new type of defrosting and ventilating fan has been developed by the Signal Mfg. Co., 587 Washington St., Lynn, Mass. An adjustable double action twin fan with safety rubber blades has been designed in such a manner that it can be focused on the entire windshield, insuring clear vision. This twin action defrosts the



entire windshield and the side windows of sleet, snow and foggy conditions. Electric motor vibrations have been reduced to a minimum. The fan is equipped with a screw-fastening clamp, providing adustment to fit all types of windshields or dash boards.

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### *Commercial Solvents to Supply Alcohol*

Users of all forms of industrial alcohol in the automotive industry, who have heretofore been supplied by the American Distilling Co., or its affiliate, American Commercial Alcohol Corporation, will be served from now on by Commercial Solvents Corporation.

According to a recent announcement by William D. Ticknor, president of Commercial Solvents, the American Distilling Company and its affiliate have turned over to Commercial Solvents their entire industrial alcohol business, including good-will, permits, and that part of their sales force specializing in industrial alcohol.

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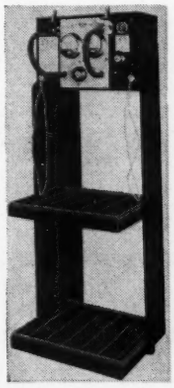
### *Exide Has New Line Of Battery Chargers*

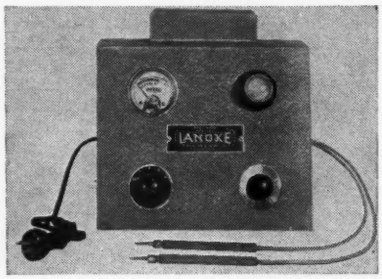


The Electric Storage Battery Co., Allegheny Ave. and 19th St. Philadelphia, Pa., has introduced a complete new line of battery charging equipment. The new line includes the DeLuxe and Standard model chargers, with built-in Exide Sure-Start Testers; also a complete line of utility chargers designed for either wall or floor mounting.

The Standard model, illustrated, consists of an open rack with charging positions for six batteries on two shelves. The built-in Tester is a new model Exide Sure-Start Tester No. 45. It is built into the rack instead of being located on top as in the case of the DeLuxe models.

### *New Condenser and Circuit Tester*

Lanagan & Hoke, Inc., 1638 W. Hunting Park Ave., Philadelphia, Pa., has introduced a new condenser and circuit tester which is said to give every conceivable condenser test, including capacity, breakdown, leakage,




and series resistance. It can also be used to check insulation in brushholders, armatures, coils, caps, rotors, and a score of other insulation difficulties as well as shorts in the entire wiring system. It is compact and portable, and is equipped with a D'Arsonval moving-coil instrument. Net price $24.50.

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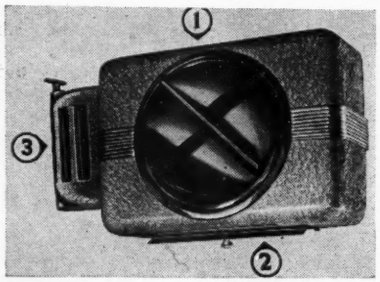
### *Perfection Heaters*

The new Perfection Heater line made by Eaton Products, Inc., 739 E. 140th Street, Cleveland, Ohio, includes two combination heater-defroster models with several unusual features. The dual purpose of providing an ample volume of air for both heating and defrosting is accomplished with only one 6-blade fan of unique design and one motor which draws less




than 3 amperes. The Duplex Sr., illustrated, blows heated air in three directions: (1) straight out through the heater doors, (2) on the passenger's feet through a door in the bottom, and (3) to the driver's feet or to the windshield defroster outlets through the louvers in the left side.

### *Franklin To Build Heavy Duty Engines*

The Franklin name will once more be seen in the automotive industry. The Air Cooled Motors Corporation, which recently took over the plant, assets, patents and good will of Doman-Marks Engine Company, Inc., of Syracuse, N. Y., announces the acquisition of the name, trade-mark and patents of the Franklin Company.

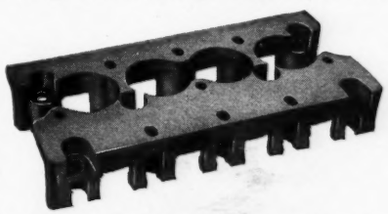
According to their president, Lewis E. Pierson, Jr., of New York City, the new company will continue to manufacture heavy duty air-cooled units for use in trucks, air compressors, and other industrial equipment. These engines will be offered to the industry as Franklin Heavy Duty Air-Cooled Engines.

E. S. Marks and Carl Doman, who were chief engineer and experimental engineer, respectively, for Franklin and later founded the Doman-Marks Engine Company, Inc., are officers in the new company and will head the technical and production staff.

Former Franklin dealers have expressed interest in the new company set-up and in its acquisition of the valuable Franklin patents. As a large part of the sales activity of the company is in filling the demand for replacement engines in trucks and industrial equipment, it is said to be likely that the sales organization of the Air Cooled Motors Corporation will contain a considerable number of former Franklin representatives.

### *Plate for Boring Bar*

A plate that can be used to bore Dodge and Plymouth motors with the block in the chassis and without removing the valves or studs has been



announced by the Storm Mfg. Co., Ind., 406 Sixth Ave. South, Minneapolis, Minn. By eliminating the removal of valves and studs, the reboring job can be done at approximately the same cost as a ring removal job. Piloting from the ground surface of the plate insures extreme accuracy. Openings at each end of the plate and between the cylinders enable the operator to see the cutting of each bore. The plate is attached securely to the block by using six stud nuts. List price, $19.00.

## CLASSIFIED ADVERTISING

INVENTORS—Protect your rights. Before disclosing your invention to anyone send for free blank form "Evidence of Conception" and instructions. Personal attention given all cases. Lancaster, Allwine & Rommel, 415 Bowen Building, Washington, D. C.

Motor Temperature Gauges repaired $1.50. Missing parts replaced. Originators of this service. Factory Methods. Radiator Shutter Thermostats repaired $2.50. United Speedometer Repair Co., Inc., 436 W. 57th St., New York City.